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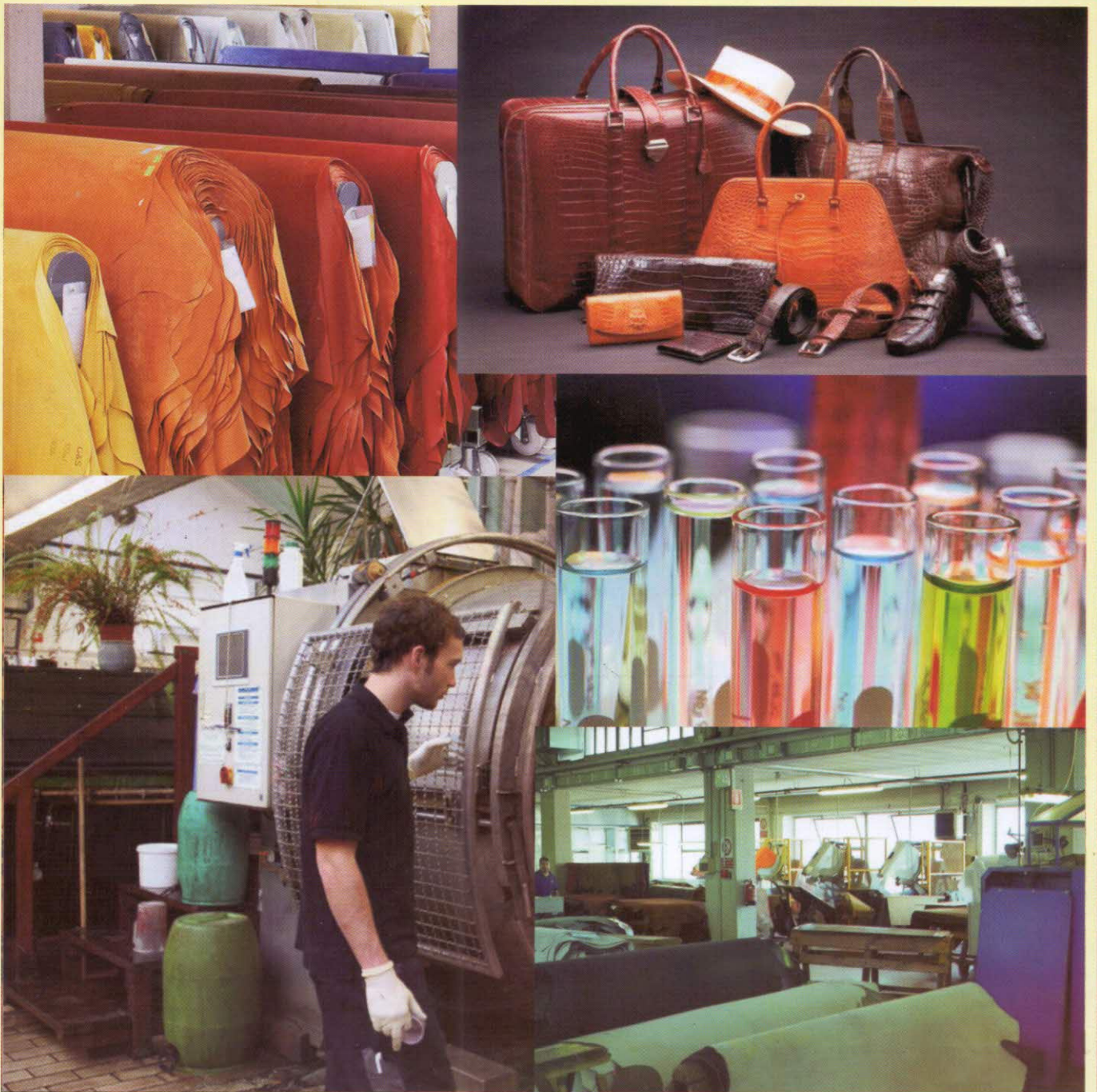


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# JILTA

Journal of Indian Leather Technologists' Association

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## JOURNAL OF INDIAN LEATHER TECHNOLOGISTS' ASSOCIATION (JILTA)

Indian Leather Technologists' Association is a premier organisation of its kind in India was established in 1950 by Late Prof. B.M.Das. It is a Member Society of International Union of Leather Technologists & Chemists Societies (IULTCS), Geneva, Switzerland.

The Journal of Indian Leather Technologists' Association (JILTA) is a monthly publication which encapsulates latest state of the art in processing technology of leather and its products, commerce and economics, research & development, news & views of the industry etc. It reaches to the Leather / Footwear Technologists and the decision makers all over the country and overseas.

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## **New Foreign Trade Policy of US and its Impact**

The United States' foreign trade policy has been the subject of much discussion now that the Trump administration is at the helm of the world's largest economy. President Trump has aimed much of his ire toward Mexico as the administration seeks to lower the country's trade deficit through a more protectionist trade policy. However, with the U.S. running trade deficits with almost all of its more than 75 trade partners, this begs the question, is Mexico really the problem?

Senior Economist Ricardo Aceves has analyzed on behalf of Focus Economics that foreign trade policy of United States, showing that China is actually far and away the new administration's biggest obstacle in the way of lowering its massive trade deficit. He has provided insight on the future of U.S.-China relations considering Trump's decisions on appointed advisers, the withdrawal from the Trans-Pacific Partnership, and the potential for a trade war between the world's two largest economies. The forecasts are corroborated and analyzed by in-house team of economists from Focus Economics and complemented with brief commentaries on the latest economic trends. We are exclusively indebted to Focus Economics for their far reaching views.

Donald Trump is obsessed with trade deficits as measures of how the U.S. economy has been in enormous disadvantage on trade deals. He has put Mexico in the spotlight for having sold USD 63.2 billion more in goods to the U.S. than it bought in 2016, blaming the North American Free Trade Agreement (NAFTA) as a one-sided deal that has created considerable imbalances. Total merchandise trade between Mexico and the U.S. accounted for USD 525 billion last year, where U.S. imports from Mexico were USD 294 billion and U.S. exports to its southern neighbor totaled USD 231 billion. The USD 63.2 billion trade deficit represents a 12% gap relative to total trade between the two nations and, while the size of the deficit could help to determine whether or not a trade deal is worthless, Mexico is hardly the biggest problem for the U.S. in general or for Trump in

particular. In 2016, the U.S. trade deficit totaled USD 750 billion, which is 20% relative to the total value of exports and imports. The U.S. is running trade deficits with most of its more than 75 trading partners and when considering the size of the gap the U.S. economy has with some of its biggest partners, the trade deficit with Mexico is relatively small.

A 65% exports-and-imports gap favors Ireland, followed closely by China with a 60% exports-and-imports difference. The U.S. economy also has large imbalances with Germany (40%), India (36%) and Japan (35%). Even with Russia, an USD 8.7 billion trade deficit in 2016 represents a 43 % of gap of total trade of USD 20.3 billion between the two nuclear superpowers. In plain dollars, China tops the list. In 2016, the U.S. economy bought USD 347 billion of goods from China (more than it sold to it) making it an 80%-20% split. Considering that the total trade the U.S. has with Canada and Mexico was over a USD 1.0 trillion last year, Trump's fixation on renegotiating NAFTA is understandable. However, massive trade deficits with China and other countries suggest that modifying NAFTA would not get the U.S. much closer to global trade parity. While campaigning, Trump's sweeping proposals on international trade included a 45% import tariff on Chinese goods; branding China a currency manipulator; withdrawing from the Transpacific Trade Partnership (TPP); imposing a 35% tax on U.S. businesses that offshore production of goods which they subsequently sell in the U.S. market; ripping up NAFTA if renegotiations are not satisfactory; a general import tariff of 5% to 10% on all imports except energy; and pulling out of the World Trade Organization—or at least circumventing its trade dispute system. However, given Trump's erratic behavior and fluctuating policy positions during his campaign, the choices for his cabinet and advisory positions provide a better indication of the direction that his government will take.

The new U.S. President has appointed advisers who share an ideology that China is the party responsible for the economic woes of United States. There are



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three key advisers who will be influential in guiding, and possibly restraining, the president on China–U.S. relations for the next four years. Robert Lighthizer, a long-time critic of China who served in Ronald Reagan’s administration, acts as the new U.S. Trade Representative (USTR) and will lead trade negotiations with China. Wilbur Ross, the Secretary of Commerce will oversee most of the administration’s trade policy. Ross is a wealthy businessman with extensive experience in private equity, restructuring and bankruptcy, notably in the steel, coal, vehicle components and textiles sectors, which are all sectors that have suffered competition from Chinese imports. Finally, and likely the most disruptive, is Peter Navarro who will coordinate trade efforts from the White House’s newly-created National Trade Council. Navarro’s views on China are more extreme than those of Lighthizer and Ross, while he is closer to the president. He has exerted a strong influence on Trump’s economic plans since the early days of his presidential campaign, and this has included a harsh anti-China stance. Also, Peter Navarro disagrees with the economic theory that defends the benefits of trade and comparative advantages. In fact, he wrote a book on the subject that was published in 2011 entitled *Death by China: Confronting the Dragon*, a call to global action. Lighthizer, Navarro and Ross share many positions. All claim that China uses subsidies to support its state-owned firms. They believe China’s economic success has cost the U.S. an enormous number of jobs—particularly in the manufacturing sector—which is an assessment that is partially true, but that does not complete the whole picture if technological advances in manufacturing and the globalization of supply chains are not considered too. They advocate the view that China has benefited from lower barriers to trade around the world without giving reciprocal access to its own domestic market. They also believe that Chinese businesses have engaged in widespread theft of intellectual property, often with a degree of state backing. There are some important elements to consider about the new U.S. foreign trade policy. One is the U.S. Congress, which will have the ability to either validate or block some of the administration’s decisions. Senators and representatives in the U.S. Congress have often been more conciliatory on trade-related issues as they are

subject to pressure from U.S. corporations that do business outside American borders, and so could act as a check on the administrations’ policies. That said, the executive branch has great deal of discretion in conducting foreign policy and, consequently, the most important person influencing China-U.S. relations is the president himself. Donald Trump’s erratic and impulsive interventions are making it difficult for analysts to determine precisely what the U.S. line on trade policy actually is. Although Trump’s confrontational tweets toward China and Mexico do not represent official policy, loose communication and utilizing improper channels will continue to complicate negotiations with these two countries, particularly if they contradict the policy lines being advanced by his team.

Trump’s definite withdrawal from the TPP—a campaign promise—has been a big blow for global trade and is the first decisive signal that he is serious about his protectionist trade policies. The TPP was envisaged by his predecessor, Barak Obama, as the cornerstone of economic efforts to improve trade relations in the Pacific Rim and strengthen regional alliances against rising Chinese influence. Trump also promised in his campaign to label China a currency manipulator, despite the fact that nowadays China does not fulfill all criteria to be branded a currency manipulator. This could prompt the U.S. administration to propose penalties, including tariffs, on some or all imports from China. Such an approach could prompt the Chinese leadership to retaliate, but on a smaller scale since the economic cost can potentially be massive, not to mention that this could also initiate a trade war. A Chinese response could involve tariffs targeting a narrow range of U.S. exports to China—agricultural products and luxury items could be among them—and the cancellation of orders for some large U.S. exporters such as Boeing. U.S. businesses might also face increased regulatory scrutiny from Chinese officials.

So far, the economic threats toward China have failed to materialize. But the lack of concrete action should not calm the Asian giant or any other country with a substantial trade surplus with the U.S. Much more worrying for exporters is the prospect that the Trump government could adopt a Border- Adjustment Tax



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## *Editorial*

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(BAT), which forms part of the tax reform plan being pursued by Republicans in the House of Representatives and which could effectively tax businesses' spending on all imports into the U.S., but exclude exports with the aim of generating enough revenue to give fiscal space for a large corporate tax cut. The plan has been criticized by analysts and would likely negatively impact key trading partners such as China and Germany, which could implement retaliatory measures. However, it remains to be seen if this ambitious measure will be passed in Congress, as several large U.S. multinationals, such as the retail giant Walmart, are frantically lobbying against it.

On the bright side, Chinese President Xi Jinping embarked on a week-long visit to Latin America in November last year that included state visits to Chile,

Ecuador and Peru. Xi Jinping's visit came immediately after events in the U.S. that have called into question the future of U.S.-Latin America relations, and highlights China's emergence as a key trading and investment partner for the region. China signed several trade agreements with the aforementioned countries and appears open to the possibility of expanding its array of trade deals in Latin America just as major economies in the region, such as Mexico, are keen to pursue more trade deals, and also at a time when the possibilities of developing stronger trade links with the U.S. and Europe appear increasingly difficult.

Massive trade deficits with China and other countries suggest that modifying NAFTA would not get the U.S. considerably closer to global trade parity.

*Goutam Mukherjee*

**Dr. Goutam Mukherjee**  
Hony. Editor, JILTA





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### From the Desk of General Secretary

#### **JILTA – a new look :**

“Our monthly magazine JILTA has been given thorough change of face. Pages have been upgraded in gloss, texture and look. Formats inside JILTA have also undergone changes. We have started giving spaces to commercial organizations for write up on their events, product launch or any other R&D activities. The organizations can express their happenings with commercial product names in JILTA. The spaces for that organization will be labeled as “organization corner”. We do believe that all chemical or tanning organizations do strive for commercialization of their innovative products but their intents are based on realistic positive changes of the culture of our leather industry. Therefore, we do welcome all organizations to share their product innovations, R& D activities to our leather and allied industry through JILTA. We would also fervently appeal to every commercial organizations associated with leather industry for choosing JILTA as one of the valued medium for reaching customer base. Therefore, I do wish to thank all JILTA team members for their sincere efforts to get JILTA a renewed look”.

#### **LEXPO – XXXX at Kolkata :**

The Inaugural Ceremony took place at 05.30 PM on Saturday the 11<sup>th</sup> March, 2017 at the Geetanjali Stadium, Kasba.

The programme commenced with the Welcome Address of Mr. Arnab Jha, President, ILTA which followed presentation of a bouquet by Mr. B. C. Jana to the Chief Guest, Mr. Firhad Hakim, Hon'ble Minister – in – Charge, Municipal Affairs & Urban Development Department, Govt. of West Bengal.

Mr. Susanta Mallick, General Secretary, ILTA then addressed the gathering which was followed by offering of thanks to all concerned by Mr. Alope Kr. Dey, Co-Ordinator, LEXPO Reshaping Sub-Committee.

Mr. Firhad Hakim, the Chief Guest then delivered his inaugural address appreciating the efforts made by ILTA in continuing the promotional activity. He then declared the fair open by lighting the Inaugural Lamp.

The programme was anchored by Mr. Prabir Kr. Dasgupta.

#### **6<sup>th</sup> Moni Banerjee Memorial Lecture**

This was organized at the auditorium of Indian Science Congress Association at 03.00 PM on Wednesday the 15<sup>th</sup> March, 2017.

The programme commenced with Mr. Susanta Mallick, General Secretary, ILTA briefly touching upon why we have gathered today and inviting the following to garland the portrait of Late Moni Banerjee :

Mr. Arnab Jha, President, ILTA, daughter of Late Moni Banerjee, Editor of JILTA, General Secretary, Alumni Association, GCELT, Alok Kr. Basu, Ex-Editor of JILTA, Mr. Abhijit Dutta & Dr. Samir Dasgupta.

Mr. Arnab Jha, President, ILTA then delivered his welcome address briefly touching upon the life and achievement of Late Moni Banerjee.

Presentation of bouquet to Mr. Abhijit Dutta by Mr. Sanjay Dasgupta and to Dr. Samir Dasgupta by Mr. Ranjit Bhusan Guha followed.

Mr. Susanta Mallick stated that about a month and a half ago principals of some ten institutes running Diploma Courses in Footwear / Leather Goods spread all over India were requested to provide us contact details of toppers in 2016 from their Institutes followed by a no. of reminders. Only two institutes responded.

Mr. Izhar Ahmed, the Topper from University Polytechnic, Aligarh Muslim University regretted his inability to come due to semester exam and requested for his medal & certificate to be forwarded to his home address. G. S. stated that his request will be complied with.

Mr. Soumyakanti Khanrah, the Topper of Diploma in Footwear Technology exam of CFTC, Budge Budge in 2016 was presented the Certificate by Mr. Arnab Jha and to Mr. Javed Ali Mia, the Topper of Diploma in Leather Goods exam of CFTC, Budge Budge in 2016 by Dr. Samir Dasgupta. Since the names were received only last night, Medals will be ordered and sent on receipt.

Mr. Alope Kr. Basu, Ex-Editor, JILTA then read out from a brief write up on Late Prof. Moni Banerjee.



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Mr. Abhijit Dutta was then introduced to the gathering by Mr. Arnab Jha and requested to deliver the 6<sup>th</sup> Moni Banerjee Memorial Lecture titled **“Techniques of Finishing of Upholstery Leather : Furniture vis-à-vis Automotive”**. After the lecture, Mr. Susanta Mallick presented a memento to Mr. Abhijit Dutta.

Just about 10/12 days prior to today’s function, General Secretary, ILTA and Secretary, Alumni Association, GCELT met Dr. Samir Dasgupta at a gathering in GCELT and requested him to deliver, if possible, lecture on **“Future of Leather Industry”**. Dr. Samir Dasgupta kindly consented. Mentioning the background and thanking Dr. Dasgupta, Mr. Susanta Mallick, General Secretary, ILTA requested him to deliver the lecture. The lecture which was most informative lasted for about an hour.

Above was followed by Mr. Susanta Mallick thanking all concerned for help and co-operation received in successfully organizing today’s function and requested all present to help themselves to Tea & Refreshments served just outside the auditorium.

**LEXPO – XXIII at Siliguri :**

The Inaugural Ceremony of LEXPO Siliguri – XXIII is scheduled to take place at 06.00 PM on Friday 31<sup>st</sup> March, 2017 at the Kanchanjungha Krirangan adjacent ground, Siliguri. The fair will continue till 16<sup>th</sup> April, 2017.

Mr. Goutam Deb, Hon’ble Minister – in – Charge, Department of Tourism, Govt. of West Bengal has been approached to kindly grace the occasion as the Chief Guest and inaugurate the fair.

Mr. Deba Prasad Ray, Hon’ble Ex-MP & MLA, Alipurduar Constituency and an eminent social activist has been approached to kindly grace the occasion as the Guest of Honour.

**Election Schedule for reconstitution of Executive Committee of ILTA for the term 2017 - 2019 :**

The Executive Committee of ILTA at its 498<sup>th</sup> Meeting held on 14.03.2017 approved the following schedule for Election of Executive Committee of ILTA and the Regional Committees for the term 2017 – 2019.

**Reconstitution of Executive Committee of ILTA for the term 2017 - 2019**

**ELECTION SCHEDULE**

Sl. No.	Events	Election Schedule 2017-2019	Day
01	Mailing of Nomination papers & Voters’ List on or before	04.05.2017	Thursday
02	Last date for receipt of Nomination Papers	26.05.2017	Friday
03	Last date for receipt of Consent	15.06.2017	Thursday
04	Last date for withdrawal of candidature	19.06.2017	Monday
05	Mailing of ballot papers on or before	08.07.2017	Saturday
06	Last date for receipt of ballot papers From voters residing outside KMDA area & 24-Pgs (N & S)	05.08.2017	Saturday
07	Casting of votes by voters residing in KMDA & 24-Pgs (N & S) Area at ILTA Administrative Office 10-00 to 17-00 hrs. LUNCH BREAK : 1-30 to 2-30 PM	04.08.2017 & 05.08.2017	Friday & Saturday
08	Counting of votes at ILTA Administrative Office from 11-00 hrs. onwards	07.08.2017	Monday

**BEREAVEMENT**

*With profound grief and a heavy heart we announce the sad demise on 9<sup>th</sup> March, 2017 of Ranjan Gupta and of Sambhu Das Set on 13<sup>th</sup> March, 2017.*

*May their Souls rest in peace and May God give strength to the Members of the bereaved families to bear the irreparable loss.*



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- b) Kindly mention your **Membership No. (If any)** against your each and every communication, so that we can locate you easily in our record.

**(Susanta Mallick)**  
General Secretary

**Executive Committee Members meet every Thursday  
at 18-30 hrs. at ILTA Office.  
Members willing to participate are most welcome.**



**November 29 – December 2,**

**India – Kanpur, Kolkata, Ambur, Chennai.**

**Speakers:**

- Mr. Tuncay Deriner, GM Stahl India
- Dr. Harald Bauer, Global Director Wert End Chemicals
- Mr. Michael Costello, Director of Sustainability

Stahl resumed its sustainability seminars with a series of 4 presentations held in the key leather clusters across India from Nov 29<sup>th</sup> to Dec 2<sup>nd</sup>. The seminars took the form of presentations from Stahl, CLRI (Central Leather Research Institute), Unido and XXX.

**Introduction**

The Stahl presentation introduced the audience to the successful approach by which the company has integrated Sustainability into its overall corporate strategy. With transparency as the goal, Stahl's strategy is to collaborate intensively throughout the whole supply chain in order to promote responsible environmental and social practices throughout the industry. The implementation of this strategy takes the form of the 5 focus areas detailed in the Stahl 2015 Sustainability Report (include a link here): Raw Materials, Responsible Operations, Trusted Partnerships, Innovation, People and Society.

Stahl's opening remarks also touched on the area of chemical compliance, emphasizing the historical reasons behind the recent launches of MRSLs and the change in responsibility that has occurred as a result. The differences between these industry initiatives, like the ZDHC MRSL, and other compliance regulations like TSCA and REACH were also discussed.

**Technology for reducing the environmental footprint of the leather process.**

The main body of the presentation showcased the innovative chemical technologies that Stahl has introduced to tanners in order to reduce the impact of leather manufacturing on the environment. Much of this technology development is focused on the wet end process, where Stahl believes the big gains can be made. Indeed the water effluent improvements offered by **Proviera Probiotics for Leather** was the first concept introduced by Dr. Bauer. Manufactured via a fermentation process, these natural products can be used to replace or in combination with surfactants, enzymes and bacteriacides in the beamhouse process. It was pointed out that these Probiotics are already fully available and commercialized.

Secondly, the **EasyWhite Tan™** and **EasyBlue Tan™** systems were introduced, emphasizing the significant savings in water, salt and energy/CO2 that can be gained by eliminating the pickling and basification steps in the tanning process when these new systems are used. The flexibility in decision-making thanks to the EasyWhite/EasyBlue concept was also emphasized, ie: producing a base wet-white that can either be reprocessed into wet blue or continued into a wet-white /chrome-free leather can allow the tanners to keep lower levels of stock and make better decisions.

Dr. Bauer continued the story of reducing environmental impact by introducing the latest products in Stahl's **Catalix** and **Dermalix** range of retanning polymers and fatliquors. As always, even greater improvements in BOD and COD levels can be achieved with the newest products in the range.



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Advances in Stahl's leather finishing product range were presented by Mr Costello. For example, the recently introduced range of MRSL-compliant products known as **Stahl NEO**. He pointed out that not only are Stahl NEO products compliant, but they are completely free of the substances listed in the ZDHC MRSL (v 1.1), and they are free of NMP, NEP, Toluene, Xylene and many other chemicals which may be restricted in the future.

Mr. Costello rounded of the presentation with an introduction to **bio.based polyurethane** technology,

in which part of the polymer background which is currently sourced from petroleum-based feedstock chemicals can now be substituted by plant-based derivatives, which is a renewable resource. Collaboration with the biotech industry has been the secret to making this breakthrough possible for Stahl, and the work has only just begun.

The presentation closed with a final summary of the key technologies and a reminder of how each of them can reduce the environmental impact at each step in the leather manufacturing process.







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## Novel Surfactants – in Leather Processing

Dr. V. Vijayabaskar, J. K. Basu & Jayantha Chaudhuri

Leather Chemicals Department, Balmer Lawrie & Co Ltd., Manali, Chennai

---

### Abstract

This lecture addresses mainly about surfmers – polymerisable surfactant and its copolymers used in processing of leather. There will be a discussion on novel concept of making polymerized fat using a surfmer based on renewable sources. A facile method was developed in-house containing a dispersion of a selected amphiphilic copolymer and substantially free from organic solvents. They impart light fastness characteristics, reduce fogging and minimize Cr (VI) a carcinogenic generation in leather.

Another part of this paper will cover the synthesis of novel polymer based on surfmer with carboxyl functionalities. This polymer binds the free chrome on to the collagen and Cr (VI) was below detectable limits on leather on ageing.

### Background of the work

Many chemical and mechanical operations are involved in treating hides and skins to develop a leather. Two important chemical operation in the treatment of leather is fat-liquoring and retanning. Fatliquoring is used to impart the desired strength and temper properties to tanned leather. **Fatliquors** lubricate the leather fibers so that after the leather is dried its fibers are capable of sliding over one another. In addition to regulating the pliability of the leather, fatliquoring contributes greatly to the tensile and tearing strength of the leather. Retanning is done to impart good filling and other mechanical and physical properties to leather. In other words, fatliquoring and retanning in a operation is done to regulate softness and fullness of the article.

The first part of this paper deals with polymeric fatliquor which performs both as retanning and fatliquoring agents and provides the treated leather with a number of desirable properties including light fastness, strength, body etc. The main objective of the present investigation is to provide a polymer for fatliquoring as well as retanning either partially or fully which provides the treated leather with both the requisite strength and softness typically associated with the conventional fatliquors and also provide

superior light fastness. There will be also significant reduction in the usage of conventional syntans and fatliquors in the processing of leathers

Another application as chrome fixing agents binding the free chrome in wet blue by incorporating the copolymers based on non-ionic surfmers have been mentioned. These copolymers prevent the oxidation of free chrome to Cr (VI) under ageing conditions

### Surfmers

The amphiphilic copolymers have been selected because of their ability to provide the leather with desirable strength and aesthetic softness characteristics and filling while reducing the total consumption of syntan and fatliquor in the recipe substantially. It was found that dispersions of these amphiphilic copolymers, preferably in the form of aqueous emulsions, are substantive, or in other words they remain in the treated leather, and provide exceptionally good light fastness even under stringent conditions. The selected amphiphilic copolymer must contain at least one hydrophobic monomer or surfmer. The term **surfmer refers to polymerisable surfactant**. Conventional surfactants are anchored on the polymer emulsion particle surface by physical forces alone and, hence their adsorption-desorption equilibrium has a crucial role in governing the stability and other characteristics of latexes prepared using them<sup>1</sup>. It is desirable therefore to have the surfactants covalently bound to the polymer latex for enhanced stability and performance. This can be used by using reactive surfactants, which become an integral part of the polymer during polymerization and would selectively reside on the surface of the latex providing it the requisite stability. The area of reactive surfactants has witnessed a surge of activity during the last decade, in part because of the combined efforts of many European laboratories<sup>2-4</sup>.

There are three types of surface active agents with polymerising capabilities used in polymer synthesis.

1. Transurf – Chain transfer agent
2. Inisurf – surfactant and an initiator and
3. Surfmer – Surfactant and a monomer.

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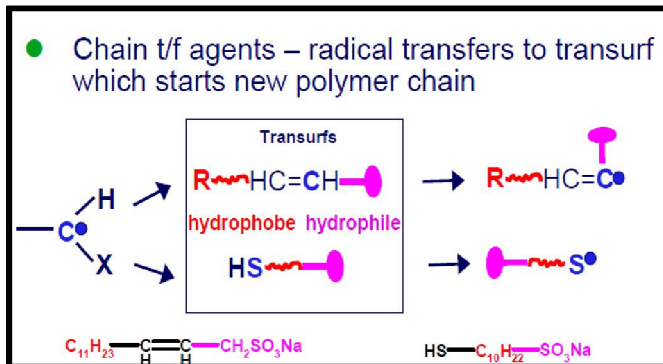
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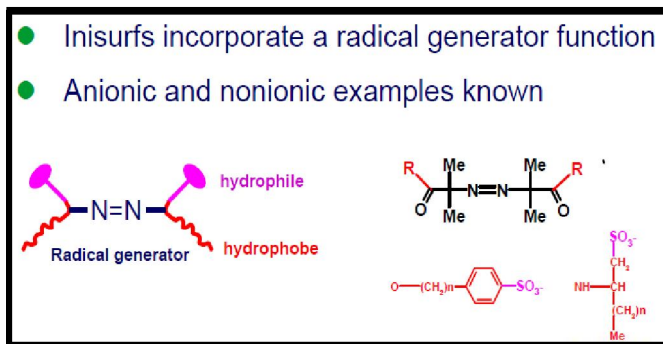
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The examples are given below :

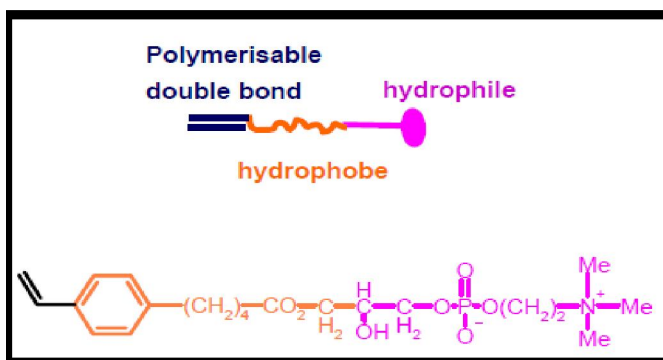
**Transurf :**



**Inisurf**



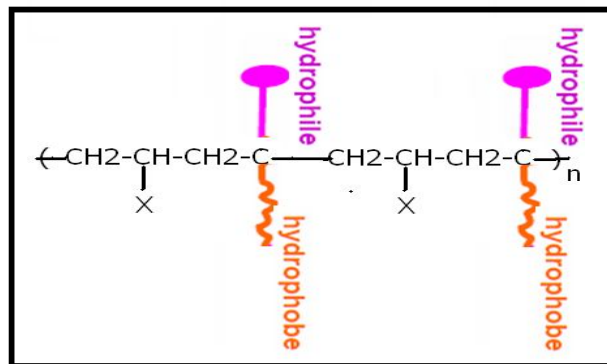
**Surfmer**



Some reviews provide a comprehensive summary of the current status of this field<sup>5,6</sup>. These polymerisable surfactants have extensive applications such as in synthetic rubbers, paints, adhesives, binders, additives in paper and textiles, impact modifiers, solid phase flocculants, rheological modifiers, solid phase supports in catalysis, diagnostic assays, cell separation, and drug delivery systems<sup>7-16</sup>. In this work an attempt has been made to utilize these class of polymers in leather treatment applications

**Preparation of Polymeric fat preparation through Surfmers**

Long chain esters with terminal vinyl groups are used as surfmers and are prepared by esterification of fatty alcohols with carboxylic acids with vinyl ends. Different esters of with carbon number varying from C-12 to C-18 were prepared. Finally it was optimized that copolymers based on lauryl esters with acrylic acid were found to give better performance as compared to other esters. Acrylic acid was used as other hydrophilic comonomer. The copolymer is prepared through inverse emulsion technique by dispersing under vigorous stirring with 1 mole of hydrophilic monomer in 1.2 moles of surfmer. A very little amount of water with initiator dissolved in it is added just to form the interface. The unreacted surfmer is determined by extraction with acetone. The copolymer after acetone extraction is soluble in chloroform and can be characterized by <sup>1</sup>H NMR spectroscopy. There will be more than 90% incorporation of surfmer in the copolymer composition. This process also helps in processing a copolymer with very high % solids<sup>17</sup>. Such a high molecular weight polymer surfactant is very much useful in emulsifying most of the oils. The copolymer with surfmer units as its co-monomer is given below.



The final copolymer is diluted to 30% solids and used as a polymeric fatliquor and retanning in leather applications. The polymerisable surfactant or surfmer is used in the present invention also act as a chrome fixing agent and thereby, reducing the percentage of chrome loading in the effluents.

**Preparation of Leathers**

The evaluation of the selected polymeric *fatliquors* with less amount of syntans and other conventional



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fatliquors was compared to standard recipe of known percentages of conventional syntans and fatliquors to make upper type of leather. In Trial 1 Polymeric fatli liquor alone is used and compared with recipe of conventional process to make upper leathers. The physical and organoleptic properties are given Table 2 & 3.

**Table -1 Percentage Usage**

	TRIAL 1		TRIAL 2	
	LHS	RHS	LHS	RHS
Polymeric Fatli liquor	15	-	12	-
Fatli liquor	-	5	-	5
Syntan	-	20	3	20

**Table -2 Physical Properties**

Tensile Strength (Kg/cm <sup>2</sup> )	256.25	218.9	244.78	220.89
Elongation(mm)	71	51	65	48
Grain Crack Load (Kg)	39	24	32	26
Distension 1	11.75	10.1	9.60	8.5
Bursting Load (Kg)	>65	32	>58	34
Distension 2	>12.28	11.30	>11.50	10.58
Lightfastness	Grade 4 on grey scale	Grade 3 on grey scale	Grade 4 on grey scale	Grade 3 on grey scale

**Table -3 Organoleptic Properties**

Inner softness	3.5	4.5	3.8	4.5
Fullness	4.0	4.5	4.0	4.5
Surface touch	4.5	4.5	4.5	4.5
Grain tightness	4.5	4.5	4.5	4.5
Feel	Slightly papery	Leathery	Slightly papery	Leathery

The slight papery feel could be adjusted by incorporation of little % of conventional fatli liquor in the recipe

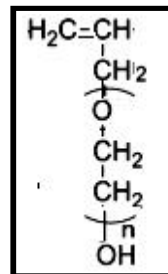
\*Evaluated on a scale of 0-5

0 - poor; 5 - excellent

We have launched fatliquors with surfmers as co surfactants and in the process of commercializing a retan fatli liquor with both filling and to provide softness to leather.

### Chrome fixing agent

A terpolymer with multiple carboxyl functionalities was prepared by solution technique radical polymerization of a non-ionic surfmer with allyl ends with other comonomers. This polycarboxylate ether based polymer with multiple carboxyl ends binds more chromium to leather and few leather trial showed that Cr (VI) generation is avoided. The allyl polyethylene glycol ether based surfmer used is mentioned below :



In this trial Table 4, 2% ter poly me based on the pelt weight is tried as a chrome exhaustion aid

**Table -4**

	Trial with 2% Terpolymer	Control
Cr (VI) as per DIN ISO 17075 under ageing conditions	Nil	9 ppm
Total Chromium (Cr) content % as Chrome oxide ( Cr <sub>2</sub> O <sub>3</sub> )	3.2	2.5

There is a 30% improvement in chromium bound to collagen with the aid of multiple carboxyl functionalities in the terpolymer. A product Balfix PAC 20 based on this approach was launched.

### Conclusions

A synthetic route to prepare a polymeric fatli liquor with maximum weight % of about 90 % of polymerisable surfactant- surfmer in its copolymer composition . This polymeric fatli liquor functions both as a fatli liquor and retanning agent matching the physical properties requirements of upper leathers . Apart from



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this the light fastness imparted by this fatliquor could be taken as a major advantage. This also minimises the loading of conventional fatliquors in the recipe which would result in fogging. A terpolymer based on non ionic surfmer avoids the Cr(VI) formation by binding more chromium due to probable complex formation with multiple carboxyl groups.

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### Acknowledgments:

Sincerely thank Prof. S.Ramakrishnan , IPC , IISC , Bangalore for his technical advice in this work .



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### **PRODUCT BASKET DIVERSIFICATION NEEDED TO BOOST EXPORTS : FIEO**

At a time when developed economics are adopting protectionist measures to insulate themselves from global economic uncertainties, exporters need to diversify their product basket to remain competitive, FIEO has said.

"We have to diversify our product basket to tap new markets and boost exports. We have requested the Commerce Ministry to work on this aspect. Major trade is happening in goods like hi-technology items," Federation of Indian Export Organizations (FIEO) director general Ajay Sahai told PTI. He added that the order books of exporters are 'better but not encouraging'.

India's main export items include textiles, gems and jewellery but globally, the trade of these goods are not much, he said. Diversifications of product basket is also important to increase share of India's global trade, Sahai said. Other major items the country exports are engineering products, petroleum goods and pharmaceuticals.

According to a report, in the top 100 import items of the world in 2010, India has only 15 items with a share of 2 per cent and above. India's exports rose 4.32 per cent in January to USD 22.11 billion mainly due to increase in shipments of petroleum products, engineering goods and iron ore even as trade deficit widened to USD 9.84 billion. Going by this trend, this financial year, exports will reach close to USD 270 billion, according to FIEO.

On the impending introduction of Goods and Services Tax (GST), Sahai said it could create liquidity problem for exporters. Exporters have demanded that the GST Council should keep exports out of the GST framework and levy lower taxes on labour-intensive sectors like leather and plantation.

### **WOODLAND TIES UP WITH CHINA'S AOKANG**

While China made shoes still flood the market, India made footwear will now be a part of 500 odd retail outlets in China. In a strategic move to globalize their brand reach, Wood reach, Woodland signed a partnership with Aakong International in China.

*(Source – Economic Times : 14.02.2017)*

### **EXPORT SECTOR ON REVIVAL PATH**

Continuous positive growth since the last five months in the current fiscal provides hope that the export sector was in the path of revival Regional Chairman, Federation of India Export Organization (FIEO) Southern Region, A Shaktivel said here today.

Reacting to the export performance for January, he said the positive growth, coming after two years of consecutive negative growth, was the result of various steps taken by government, including special packages for textile and leather sector, interest equalization scheme announced for five years.

*(Source – P. T. I.)*

### **INDUSTRIES TO BE SHUT FOR WANT OF EFFLUENT TREATMENT PLANTS : SC**

Polluting industrial units across the country would be shut down if they do not have functional primary effluent treatment plants (PETPs) to stop the release of untreated waste in water in bodies within three months after notice, the Supreme Court ruled today.

Issuing a slew of directions, a bench headed by Chief Justice J S Khehar directed state pollution control boards (PCBs) to issue a common notice by way of public advertisement to all industrial units to ensure that they have set up PETPs as mandated under the law to carry out industrial activities.

"We direct concerned state pollution control boards to issue notice to all industrial units by way of a common advertisement requiring them to ensure that they have functional primary effluent treatment plants."

"On the expiry of three months notice period, the concerned state pollution control boards are mandated to carry out inspections at industrial units as to whether they have functional PETPs," the bench, also comprising Justices D Y Chandrachud and S K Kaul, said.

If industrial units do not have functional PETPs, then they will not be allowed to function any more, the court said. The bench further directed that the state PCBs will ask the concerned electricity supply boards to disconnect the power supply to the defaulting





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industrial units, which could resume their functions only after they made their PETPs functional.

(Source – P.T.I.)

### **ICT annual meeting takes place in Hong Kong**

The International Council of Tanners (ICT) held its annual meeting in Hong Kong on March 28; almost 30 members and invited guests were present.

All members reported difficulties in the market in 2016; this year was seen broadly as stable, but there was general concern about recent increases in raw material prices, which did not appear to ICT members to be justified by supply and demand conditions.

The organisation agreed to circulate and promote new ICT guidelines for the purchase of raw materials, following the lack of agreement so far on the revision of the international contracts.

In the Open Session of the meeting, Roberto Vago, representing Italian tanning machinery manufacturers' association ASSOMAC, gave an overview of electronic measuring machines. This provided background to the ICT's review of the reference method for measuring leather in the case of disputes. Giacomo Zorzi of certification institute ICEC presented the Italian certification system for leather. The discussion that followed focused on the importance of credible industry-based schemes and the need to try to avoid a proliferation of different schemes promoted by customer organisations or commercial organizations

(Source – Leatherbiz 30/03/2017)

### **Hazaribagh tanneries vow to not lay off staff**

Tannery owners in the Hazaribagh cluster in Bangladesh have agreed to not lay off any workers, according to local media reports.

The promise came after a meeting between business owners in the region and workers. It was convened

after reports earlier in March that tanneries intended to shut down their factories due to an order by Bangladesh's High Court that would see their utility services, including gas, power and water, cut off.

"The meeting discussed what would happen during the transition period and we reached consensus that we will not declare lay-offs," said Shaheen Ahmed, chairman of the Bangladesh Tanners' Association (BTA).

(Source – Leatherbiz 28/03/2017)

### **Tanners express concern as new chief minister takes over in Uttar Pradesh**

Tanners in and around Kanpur in northern India have expressed concerns about their future following the election of a new chief minister for the state of Uttar Pradesh.

Yogi Adityanath, a politician and Hindu priest, was chosen as the state's new chief minister, its head of government, on March 19. He represents the Bharatiya Janata Party (BJP) and has been described by the New York Times as a Hindu nationalist "firebrand".

His government's immediate actions have included a crackdown on slaughterhouses and meat outlets in Uttar Pradesh and tanners in the region say they have already begun to notice an effect on the supply of hides and skins.

They have also spoken of their fear that moves against the meat industry and its by-products could even lead to the closure of tanneries.

Uttar Pradesh's leather industry includes the important cluster at Jajmau in Kanpur, which has as many as 400 tanneries. The nearby clusters of Bantha and Unnao are smaller, with 25 and 15 operations respectively.

## Mechanism for Manufacture of Sports Shoe for Neuro - Physical Comfort

Arpan Sarkar<sup>1</sup>, Goutam Mukherjee<sup>2</sup>

Government College of Engineering and Leather Technology

### Abstract:

Foot is one of the most important parts of human body. Now a days due to sense generated out of globalisation and rapid loss of greenery most people are trying to use shoes to protect their feet from outer environment, in sporting activities where rapid movement of body happens needing more comfort to our feet (to decrease the stress of exercise) for better performance. So, comfort factors means mostly neurological & physical comfort, how these factors console during rapid physical exercise. We shall stress how these comfort factors are enhanced by use of sport shoes during exercise or running or simple walking purpose. There are some major factors including cushioning effect in a sport shoe by which comfort parameters of body are enhanced when we are doing exercise or having some rapid movements during some sporting events. These factors are mainly dependent on properties of materials were used during manufacture of wares, designing of footwear by analysing the foot & body movements during different sporting events and particular construction process of manufacture. There are different types of sport shoes for various sporting events with different designing and manufacturing process. These different types of shoes have different features based of their designs.

### Key words:

Rapid movements, joints, running, BDNF, endorphins, mean loading rate, impact transient, forefoot strike, heel strike, cement-lasted, slip lasted, pronation, supination.

### Introduction:

While most footwear protects and supports the foot, the sport shoe goes beyond what one would expect of the ordinary shoe. We use footwear to protect the feet from external environment. Now a days people are using this as a part of fashion and to remove

abnormalities of foot. Sports shoes help to perform the special tasks like running, climbing, skating etc. So here we are mostly concerned about the special tasks like running, climbing, skating, and other sporting activities which are done by athletes or ordinary people using some special kind of shoe or sport shoes. It is because due to rapid movement of body the magnitude of ground reaction force is changed all of a sudden and thereby causing significant transient impact on our nerves and also on Hip/Knee joints. So we use sport shoes to decrease injury. Sport shoes also have more longevity than normal footwear sustaining under rapid movement of body.

So the mechanism of manufacture of sport shoe is such a unique process by which we are getting neurological and physical comfort as well as better protect ability/sustainability during rapid movement condition of body.

### Discussion:

Cause of neuro- physical comfort:

After starting exercise brain recognizes moments of stress. To protect body and brain from stress, body releases a protein called **BDNF (Brain-Derived Neurotrophic Factor)** from Submandibular gland. This BDNF has a protective and also reparative element **to memory neurons and acts as a reset switch**. That's why we often feel so at ease and things are clear after exercising and eventually we get happy if not excessively stressed. At the same time, Endorphins, another chemical to fight stress, is released in brain. These endorphins tend to minimize the discomfort of exercise, block the feeling of pain and exhaustiveness. This is how the neurological comfort factors are developed by running or exercise. As we perform more exercise we feel more relaxed and comfortable due to more formation of BDNF and Endorphins.

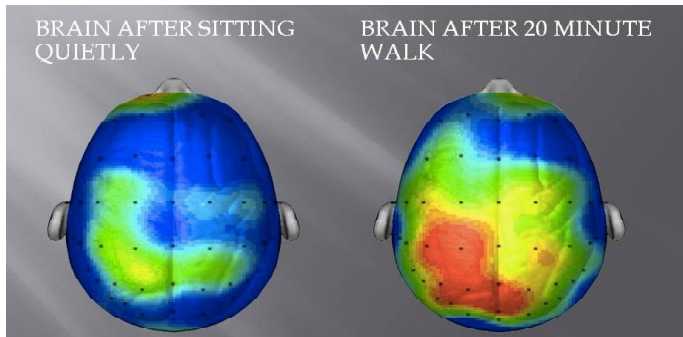
The following diagram illustrates intrinsic views of brain for development of neurological comfort due to running or some sporting activities :

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Figure I:



Neurological changes do happen due to Endorphin & BDNF formation during simple walking to reduce the stress.

Illustration of the very position of Submandibular gland:

The submandibular glands are bilateral salivary glands located in the face. Their mixed serous and mucous secretions are important for the lubrication of food during mastication to enable effective swallowing and aid digestion.

The submandibular gland is located within the anterior part of the submandibular triangle. The boundaries of this triangle are :

1. **Superiorly** : Inferior body of the mandible.
2. **Anteriorly** : Anterior belly of the digastric muscle.
3. **Posteriorly** : Posterior belly of the digastric muscle.

**Anatomical Structure:**

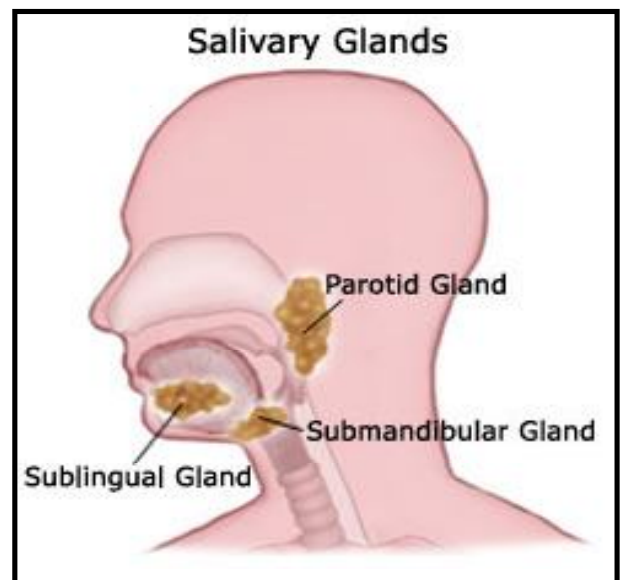
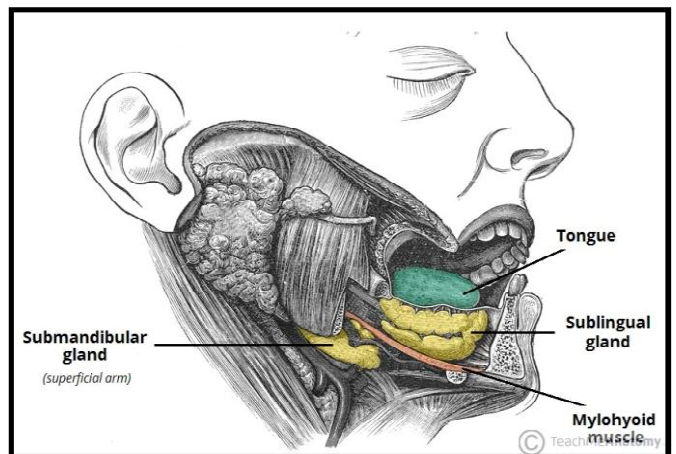
Structurally, the submandibular glands are a pair of elongate, flattened hooks which have two sets of arms; superficial and deep. The positioning of these arms is in relation to the mylohyoid muscle, which the gland hooks around.

- **Superficial arm** – Comprises the greater portion of the gland and lies partially inferior to the posterior half of the mandible, within an impression on its medial aspect (the submandibular fossa). It is situated outside the boundaries of the oral cavity.

- **Deep arm** – Hooks around the posterior margin of mylohyoid through a triangular aperture to enter the oral cavity proper. It lies on the lateral surface of the hyoglossus, lateral to the root of the tongue.

Secretions from the submandibular glands travel into the oral cavity via the submandibular duct(Wharton's duct). This is approximately 5cm in length and emerges anteromedially from the deep arm of the gland between the mylohyoid, hypoglossus and genioglossus muscles. The duct ascends on its course to open as 1-3 orifices on a small sublingual papilla (caruncle) at the base of the lingual frenulum bilaterally. BDNF is produced from this gland.

Figure II:





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**Relationship with Nerves:**

Both the submandibular gland and duct share an intimate anatomical relationship with three principal nerves; the lingual nerve, hypoglossal nerve and facial nerve (marginal mandibular branch). The courses of these nerves are briefly outlined:

- **Lingual nerve:** Beginning lateral to the submandibular duct, this nerve courses anteromedially by looping beneath the duct and then terminating as several medial branches. The terminal branches ascend on the external and superior surface of hypoglossus to provide general somatic afferent innervation to the mucus membrane of the anterior two-thirds of the tongue.
- **Hypoglossal nerve:** Lies deep to the submandibular gland and runs superficial to hyoglossus and deep to digastric muscle.
- **Facial nerve (marginal mandibular branch):** Exits the anterior-inferior portion of the parotid gland at the angle of the jaw and traverses the margin of the mandible in the plane between platysma and the investing layer of deep cervical fascia curving down inferior to the submandibular gland.

**Cause of physical comfort:**

As we run or do any rapid movement our muscles and joints get stretched and released constantly. Thus the elasticity and strength of muscles, joints (ANKLE, KNEE, HIP joints), tendons are increased. So when we do any normal work we feel very easy to do those works because of enhanced elasticity of muscles, joints etc. When we do any exercise or running or any rapid movement in barefooted condition then some drawbacks do exist physically or neurologically. The physical drawback is that when we do any rapid movement at barefooted condition there happens some certain impact transient or collisions on some joints (hip, knee, and ankle). So, there can be possible injury on joints. If the surface of that base of rapid movements is not that much smooth then our feel at the time of exercise will not be so good at barefooted condition (neurologically). So the neuro - physical comfort factors are reduced comparatively in barefooted condition than that of condition while wearing sports shoes. It is because when we do wear

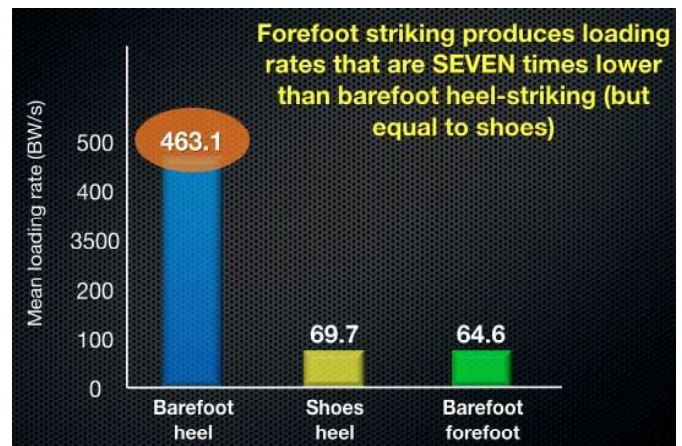
a sport shoe then there is some special cushioning effect for which during the time of foot striking soil the factor of collision between joints (hip, knee, ankle) is reduced (less chance of injury) as *mean loading rate* is decreased and the feel during running or exercise or rapid movements is also improved. Therefore, the time duration of exercise or running or some rapid movements of body increases resultantly. So, as our body can do more exercise (due to less impact transient on joints & soft feeling) the flexibility of muscles, joints increase more so. Thereby physical comfort factors are enhanced and also for extra exercise there is more secretion of BDNF and Endorphins which can reduce more discomfort of exercise and our body feels much more relaxed and fresh after exercise compared to that in barefooted condition. Thus the Neurological comfort factors are enhanced.

**Comparative discussion of decrement of mean loading rate caused by sport shoe:**

The most common and effective form of exercise is running briskly. Running style varies from person to person. Some people use to run with heel strike first mode and it can be either barefooted or in shoed condition. Other way of the habitual action of running for some other people is forefoot strike mode (barefooted or shoed).

The mean loading rate during running varies due to its different action and condition.

So, as the mean loading rate decreases the collision between the joints (hip ,knee ,ankle) also decreases. So, the time duration for running increases. Lastly all the Neuro - Physical comfort factors are enhanced with decrement of mean loading rate.





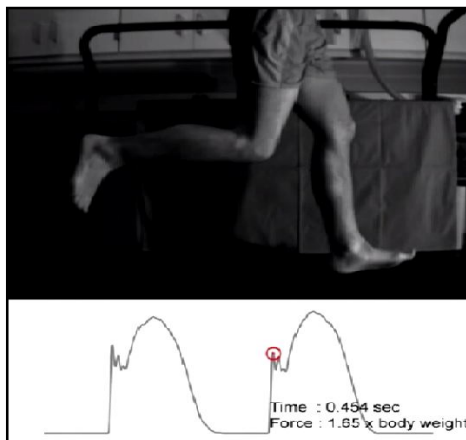
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Now we can observe from the above graph that –

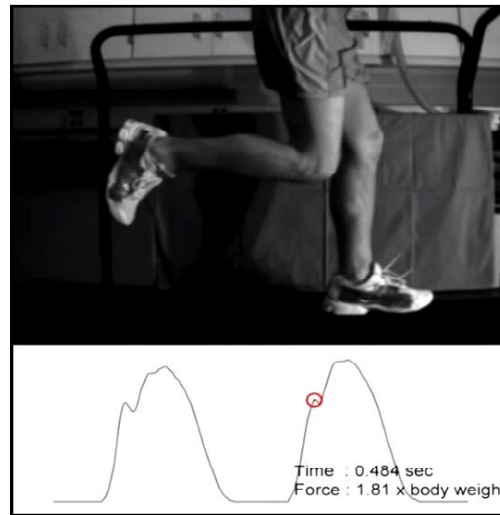
1. The mean loading rate is maximum at the time of barefoot heel striking running condition. It is because when the heel strikes at the ground first then the whole impact transient goes upward and it affects the joints and means loading rate increases as there is no load on arch of foot at the time of descent.
2. The mean loading rate is surprisingly decreased at the time of shoes heel striking running condition. It is because of the cushioning effect of shoes at the heel region it absorbs the impact transient at the time of landing.
3. The mean loading rate is minimum or comparatively equal to shoes heel striking condition in this graph at the time of barefoot forefoot striking running condition. It is because at the time of running when the fore part of foot strikes the ground then the impact transient distributes at the fore part of the foot through the arch of foot & arch continues to stretch so, there is no collision at the joints.

So, from the results of this graph we can easily conclude that at the shoes forefoot strike running condition the mean loading rate will be less than that of barefoot forefoot strike running condition. It is because there the impact transient distributes through the arch and also by the cushioning effect of sole the extra impact transient is also absorbed.

Illustration of different types of running action in different condition with graph [force(body weight) vs time(sec)] to show decrement of mean loading rate in terms of Impact Transient :

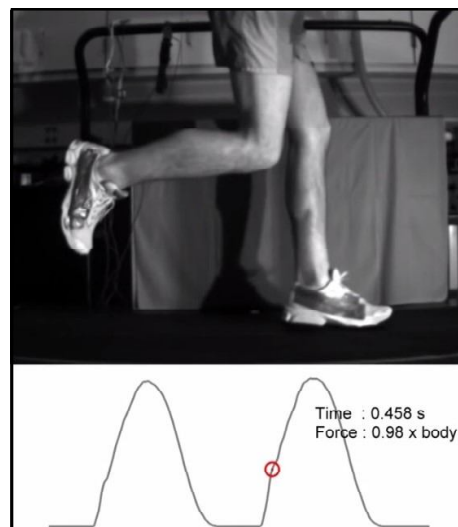
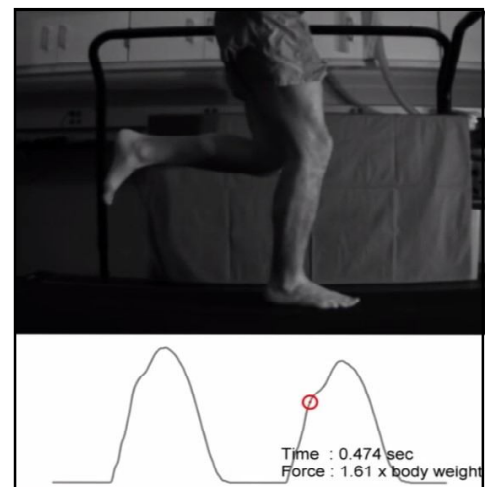


Barefoot heel striking condition With maximum impact transient So, mean loading rate is maximum



Shoed heel striking condition Impact transient is less than barefoot heel strike Mean loading rate is much more less than no.1.

Barefoot fore-foot striking condition Impact transient is very less (than no. 2) and curve is so smooth So, mean loading rate is less than or equal to no. 2



Shoed fore-foot striking condition impact transient absent and curve is almost smooth mean loading rate is minimum





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\*\*Here in these illustrations, Impact Transient is the initial peak of curves with red circle. There are no such initial peaks in no. 3 and no. 4 curves. The X axis in these curves is time (sec) and Y axis is force (body weight)

That's why forefoot strike running condition in shoed mode is most efficient running condition to enhance the Neuro Physical comfort factors & sport shoe or running shoe is essential for sporting purpose.

### Positive facts of Forefoot Strike running mode with shoes:



1. This is the perfect form of running
2. The mean loading rate is minimum
3. Extra cushioning effect of shoes absorb extra impact transient (more than barefoot) out of the joints - mostly from knee and hip joint
4. Reduces risk of injury
5. Strengthen the muscles, tendons and ligaments of the foot.
6. Activates the smaller muscles in the foot.
7. **Improve balance and proprioception.**
8. Makes solid and connected base that supports all movements.

Making process of Running Shoe :

Running mode is the most common action in any sports. So, running shoe is most basic shoe among sport shoes. The concepts of basic aspects of simple running shoe are necessary.

### Raw materials :

Running shoes are made from a combination of materials. First come to sole materials because sole is the most important part of a running shoe or sport shoe. It gives most demanding comfort factor. The sole has three layers: insole, midsole, and outsole.

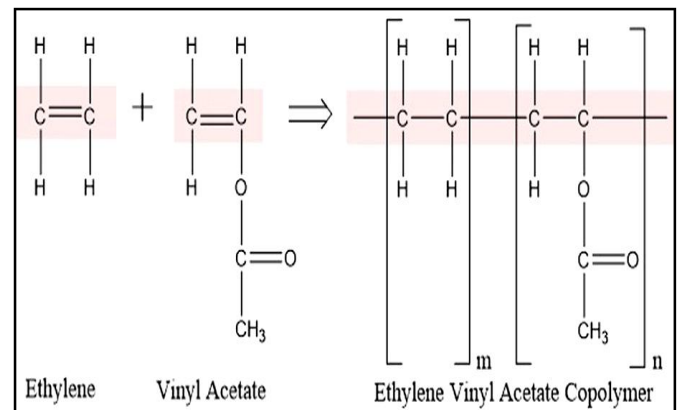
### Insole material:

The insole is generally a thin layer of man-made ethylene vinyl acetate (EVA)

### Properties of EVA :

- EVA is an elastomeric polymer that produces materials which are "rubber-like" in softness and flexibility.
- The material has good clarity and gloss.
- low-temperature toughness
- stress-crack resistance to hot-melt adhesive waterproof properties & resistance to UV radiation

### Simple co polymeric molecular structure of EVA:

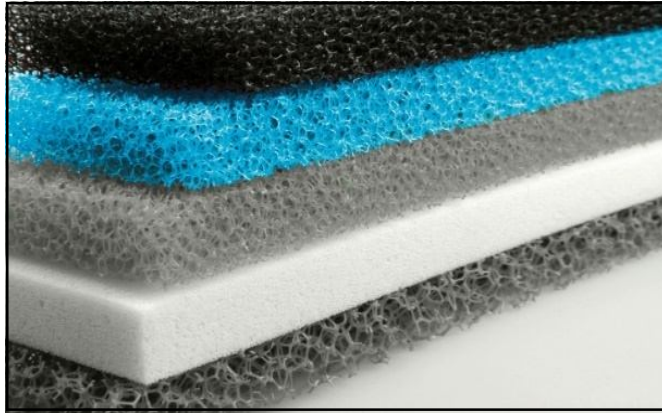


### Midsole material :

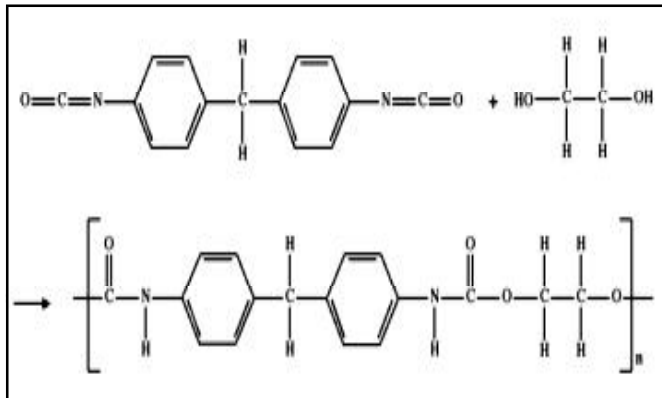
- The components of the midsole, which provides the bulk of the cushioning.
- Midsole material varies among the manufacturers.
- **Generally it consists of polyurethane** surrounding another material such as gel or liquid silicone.
- In some cases the polyurethane may surround capsules of compressed air.



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**Simple co-polymeric molecular structure of polyurethane and material :**



**Outsole material :**

- Outsoles are usually made of carbon rubber.
- which is hard or blown rubber a softer type.
- although manufacturers use an assortment of materials to produce different textures on the outsole.

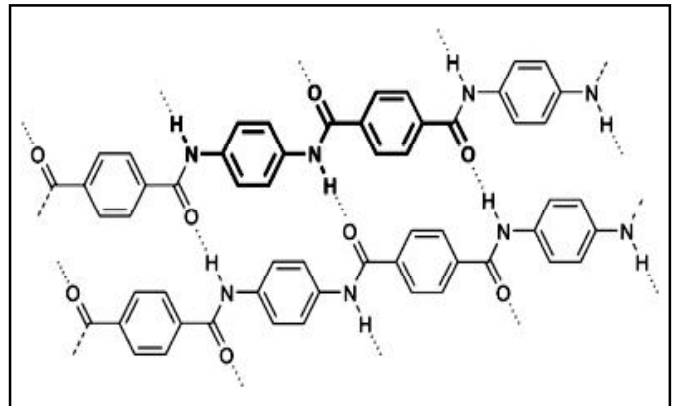
**Illustration of a carbon rubber outsole:**



**Upper and lining materials :**

The outer covering module of a running shoe is composed usually of a synthetic material such as artificial suede or a nylon weave. Now industry a popular nylon material is there for covering known as KEVLAR is used industrially. Its fibres consist of long interconnecting molecular chains produced from poly-paraphenylene terephthalamide. It's a aromatic polyamide. There lies plastic slabs or boards for supporting the shape. There may be a leather overlay or nylon overlay with leather attachments. Cloth is usually used in limited manner to the laces fitted through plastic eyelets and nails have given way to an adhesive known as cement lasting that bonds the various components together.

**Simple structure of KEVLAR & material:**





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**General features of KEVLAR:**

- High Tensile Strength at Low Weight
- Low Elongation to Break High Modulus (Structural Rigidity)
- Low Electrical Conductivity
- High Chemical Resistance
- Low Thermal Shrinkage
- High Toughness (Work-To-Break)
- Excellent Dimensional Stability
- High Cut Resistance
- Flame Resistant, Self-Extinguishing

**Adhesives for sport shoe manufacture:**

Adhesive is very important part of sport shoe manufacture because a right adhesive can only give the stability of structure that what we want in rapid movement condition. Adhesive is fully a different part of applied chemistry. For sport shoe manufacture some types of adhesives are basically needed. Two types of adhesives are basically used one is water based and another is solvent based. Water based is little bit less toxic than solvent based adhesive.

**Designing :**

Gait analysis for designing :

- Contemporary shoe designers focus on the anatomy and the movement of the foot for designing purpose
- Using video cameras and computers, they analyse such factors as limb movement
- The effect of different terrains on impact, and foot position on impact.
- Runners are labelled pronators if their feet roll inward or supinators if their feet roll to the outside
- Along with pressure points, friction patterns, and force of impact, this information is fed into computers which calculate how best to accommodate these conditions
- Designers next test and develop prototypes based on their studies of joggers and professional runners, readying a final design for mass production.

Illustration of foot alignment (pronation, supination) based of arch type of foot and sport shoe required based on foot alignment:



Pronator

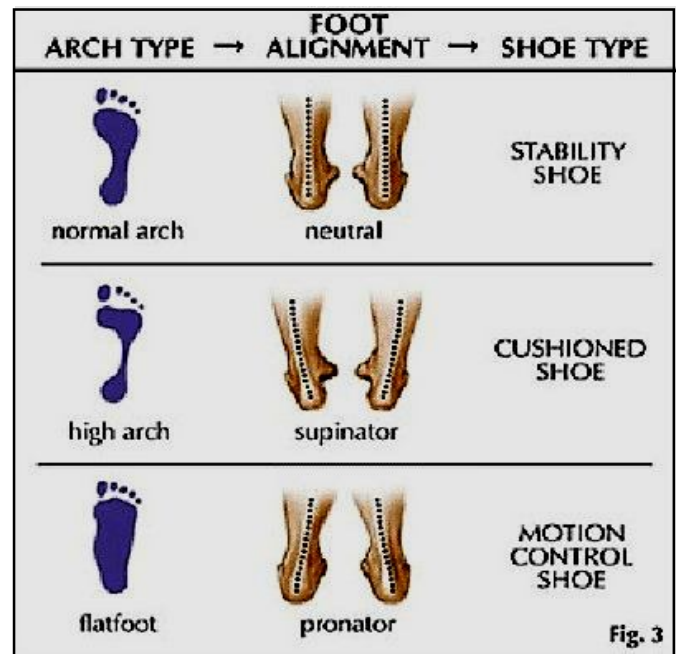


Fig. 3

Supinator

**Designing and arrangement of individual components and their functions :**

A running shoe may have as many as 20 parts to it, and the components listed below are the most basic. The shoe has two main parts: the upper, which covers the top and sides of the foot, and the bottom part, which makes contact with the surface.

- Starting at the front on the upper part is the featherline, which forms the edge where the mudguard (or toeguard) tip meets the bottom of the shoe.





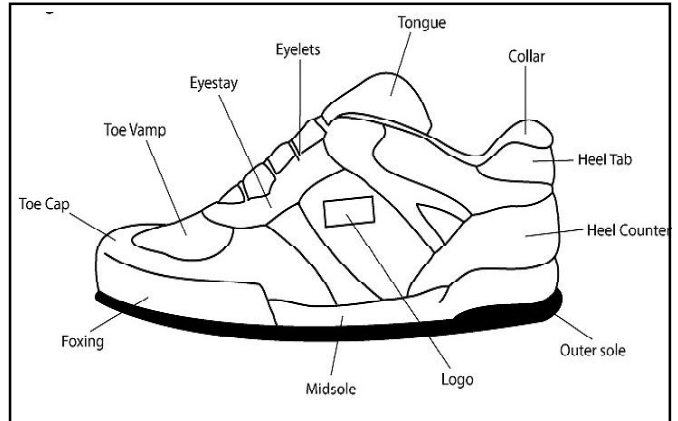
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- Next is the vamp, usually a single piece of material that gives shape to the shoe and forms the toe box.
- The vamp also has attachments such as the throat, which contains the eyestay and lacing section
- Beneath the lacing section is the tongue, protecting the foot from direct contact with the laces.
- Also attached to the vamp along the sides of the shoe are reinforcements. If sewn on the outside of the shoe these reinforcements are called a saddle; if sewn on the inside, they are called an arch bandage.
- Further towards the back of the shoe is the collar, which usually has an Achilles tendon protector at the top back of the shoe.



- The foxing shapes the rear end of the shoe
- Underneath it is a plastic cup that supports the heel, the heel counter.
- The bottom has three main parts, outsole, midsole, and wedge.
- The insole contains the arch support (sometimes called the arch cookie).
- The midsole is designed specifically for shock absorption, and the wedge supports the heel.
- The outsole provides traction and absorbs shock.

**Illustration of a sport shoe showing individual components & position of Achilles tendon:**



A brief illustration of whole manufacturing process :

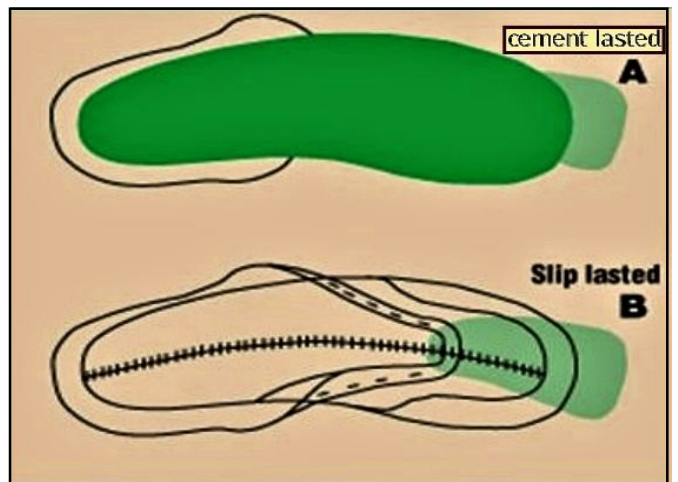
Usually there are two type of running shoes :

- 1) Slip lasted shoes &
- 2) Cement-lasted shoes

**Slip lasted shoes:** have no insole board. Instead, the single-layer upper is wrapped around both the top and the bottom portions of the foot.

**Cement-lasted shoes:** consist of an insole board that is cemented to the upper with cement.

**The simple illustration to differentiate cement-lasted shoe and slip lasted shoe:**



A is cement- lasted & for pronators & high arch people also (gives support).

B is slip lasted & for high arch people only.



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### Steps of Manufacture:

#### Shipping and stamping the fabric:

1. First, rolls of synthetic material and rolls of dyed, split, and suede leather (used as part of the foxing) are sent to the factory.
2. Next the machines do stamp the shoe shapes, which are then cut out in cookie cutter fashion with various markings to guide the rest of the assembly. After being bundled and labelled, these pieces are sent to another part of the factory where they will be stitched.

#### Assembling the Upper and the Insole:

3. The pieces that will form the upper part of the shoe are stitched or cemented together and the lace holes punched out. These pieces include the featherline, the vamp, the mudguard, the throat (with eyestay and lacing section), the tongue, reinforcements such as the saddle or arch bandage, the collar (with Achilles tendon protector), the foxing, and the logo. At this point, the upper looks not like a shoe but like a round hat, because there is extra material—called **the lasting margin**—that will be folded underneath the shoe when it gets cemented to the sole.
4. Next, the insole is stitched to the sides of the upper. Stiffening agents are then added to the heel region and toe box, and an insole board is inserted.

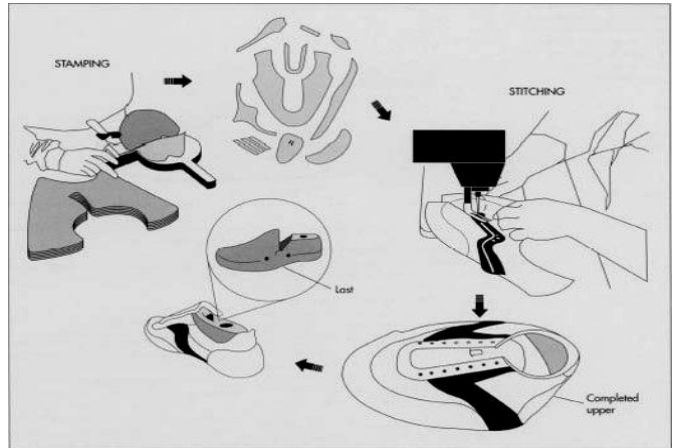
#### Attaching the Upper and Bottom parts :

5. The completed upper is heated and fitted around a last, a plastic mould that forms the final shape of the shoe. An automatic lasting machine then pulls the upper down over the last. Finally, a cement nozzle applies cement between the upper and insole board, and the machine presses the two pieces together to bond them. The upper now has the exact shape of the finished shoe.
6. Pre-stamped and cut out forms of the midsole and outsole or wedge are layered and cemented to the upper. First, the outsole and midsole are aligned and bonded together.

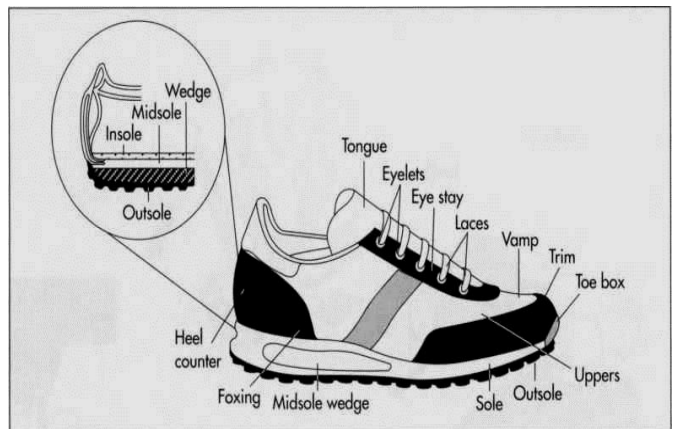
Next, the outsole and midsole are aligned with the upper and placed over a heater to reactivate the cement. As the cement cools, the upper and bottom are joined.

7. The shoe is removed from the last and inspected. Any excess cement is scraped off.

#### A brief illustration of whole manufacturing process:



#### Illustration of a complete Running shoe:



#### Running shoe with modern technology:

The shoe in the following diagram shoe is with modern technology. Even if a runner runs with this shoe with heel striking the mean loading rate will be less than barefoot forefoot striking running condition. Though there is heel strike but there will be no Impact Transient. So, there will be no collision at the joints, no chance of injury. Neuro-physical comfort will be maximum at the heel striking condition also.





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**Illustration of modern running shoe with its special features:**



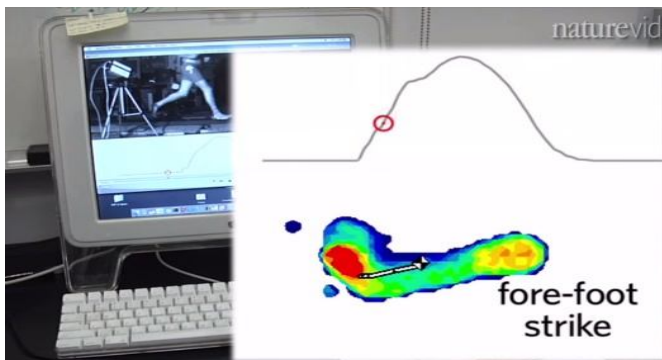
**Mechanism of work of this modern running shoe:**

The concept is both simple and ingenious. It is bestowed with following features:

- It has shock absorbing system,
- It absorbs impact for a smoother landing.
- It offers protection on joints.
- The impact energy is contained and conserved in a stride
- Then finally released for that desired acceleration.

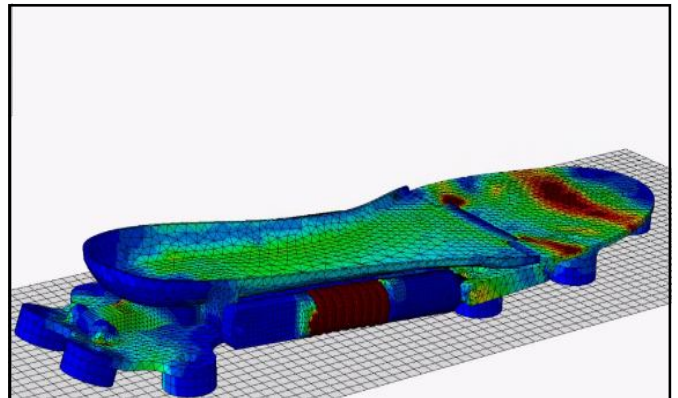
Comparison of foot patterns with illustration between barefoot forefoot strike condition and heel strike condition with this modern running shoe to see force variation to the ground:

**Barefoot forefoot strike condition:**



During strike the ground there is some forces on heel region. We can understand this from some sort of red colour at heel due to more heat formation at the time of strike.

**Heel strike condition with this :**

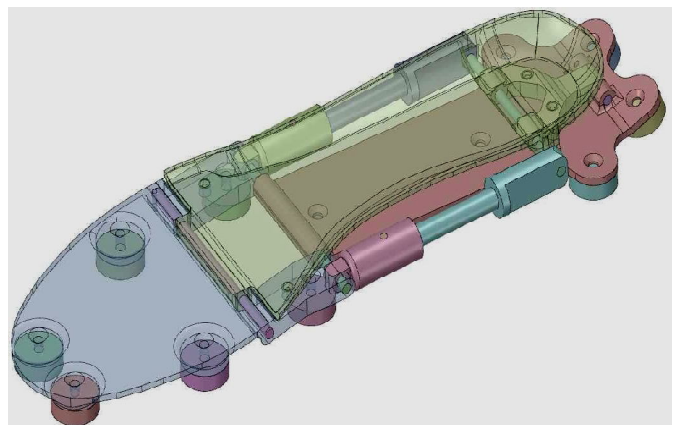


We can see here that though there is heel strike but there is no such force to the ground by heel, as there is green colour at heel region due to less formation of heat & all the impact force stores to the spring.

**Study and Design Notes for the Concept of this Running Shoe:**

This shoe utilises mechanical parts integrated into the sole, which provide it with significant cushioning (increased comfort) and energy release (increased performance). The innovative sole is equipped with two shock-absorbers, permitting a gentle release, at the right moment, of all the energy stored during cushioning of the stride.

We will evaluate in an analytical manner the quality of the cushioning and the increase in performance that "this running shoes" concept provides compared to a conventional shoe for a runner weighing 70kg running at different speeds in virtual manner.

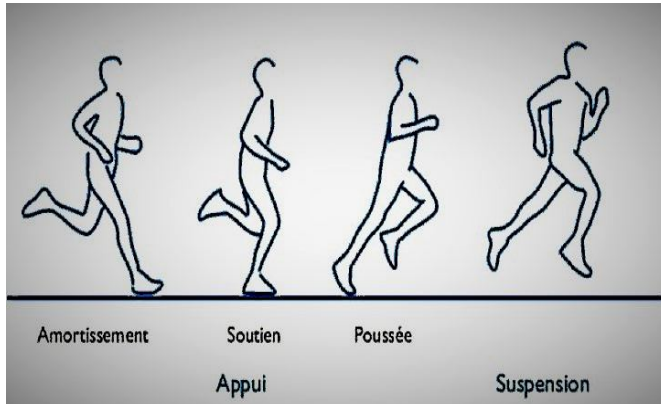


- CAD of the sole and its mechanical parts -



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### A Word About the Stride:



The stride can be defined as the bound made between two successive contacts with the ground. It consists of a period of support and a period of suspension. The period of support is the one that interests us in the context of this study, as it is during this period of time that the transfers of energy take place. It is the moment when the foot of the runner is in contact with ground.

According to this approach, this phase is divided into three successive steps

- **Cushioning phase:** Begins the moment the foot makes contact with the ground and ends when the vertical projection of the centre of gravity coincides with the vertical of support.
- **Support phase:** This is the moment when the speed of the vertical displacement becomes zero. The centre of gravity is then approximately in line with the support on the ground.
- **Pushing phase:** From a mechanical point of view, the push phase begins at the moment of support and ends when the foot leaves the ground. So it is the driving-force moment *par excellence*.

### Illustration of the different stride phases –

(Translator's key to illustration: Amortissement = Cushioning; Soutien = Support; Poussée = Pushing; Appui = Support; Suspension = Suspension)

### Description of Energy Calculation:

To address the problem of the contribution of soles to the performance of the runner, we adopt an energetic

approach. That is to say, we will estimate the amounts of energy stored and then 'restored' by the sole thanks to its shock absorbers and compare them with the amounts of energy involved during running for a runner weighing 70 kg with an average efficiency of stride.

These calculations are done for four different speeds - 9,12,15 and 18km/h, and use the referenced average energy expenditure values and a stride of average capacity. The stride amplitudes considered are 1m, 1.2m, 1.5m and 1.75m for the four respective speeds while the components of the energy cost related to the runner, which are necessary for the calculations, will come from recognised scientific data.

### Energy Stored and Released by the System with each Stride:

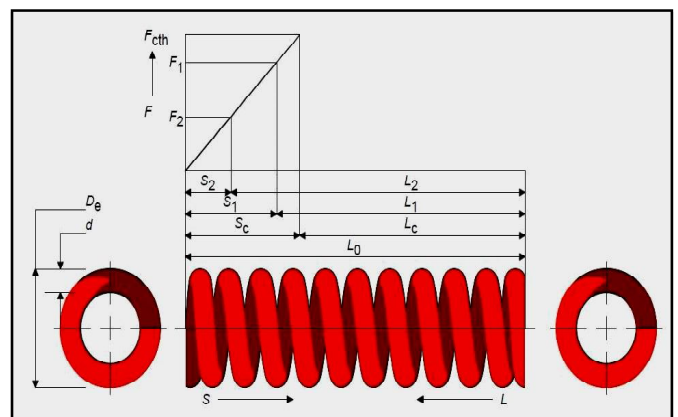
To calculate the energy stored and released by the shock-absorbers, we consider the system for the four successive phases summarised above.

At the beginning of the cushioning, the springs are released and experience no constraint. It has the a length of  $L_0$ .

During the cushioning phase, they will compress and exert a resistance force,  $F_{ressort}$ , which will help limit the energy collected by the sole and the leg of the runner.

This energy stored by the springs by compressing during the cushioning phase for a runner weighing 70 kg is as follows :

$$E_{emmag} = 2 \times E_{Ressort} = 2 \cdot \left( \frac{1}{2} \cdot K \cdot (L_0 - L_1)^2 \right) = K \cdot (L_0 - L_1)^2$$





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De = 15.2 mm  
 d = 3.1 mm  
 K = 52.8 N/mm (spring rate for a runner weighing 70kg)  
 L<sub>0</sub> = 52mm  
 L<sub>c</sub> = 40 mm

With the values obtained, we have:  
 Energy stored in the two springs:  
 $K(L_0 - L_c)^2 = 7.6 \text{ J}$

### Analysis of the cushioning phase :

What makes this shoe unique is that it is equipped with interchangeable springs chosen according to the weight of the runner, and that the cushioning phase takes place over 20 mm of the shoe's height, about ten times more than with a traditional shoe. The cushioning is always optimised, providing you with unparalleled comfort.

Energy cost of running :

This energy cost is a factor widely studied in the field of running; it is estimated from energy balances from a large number of representative runners.

For a runner weighing 70 kg, this cost is:

- ✓ **1,036** kcal/kg/km (4,330.5J/kg/km) at 18km/h
- ✓ **1,028** kcal/kg/km (4,297J/kg/km) at 15km/h
- ✓ **1,027** kcal/kg/km (4,292.9J/kg/km) at 12km/h
- ✓ **1,037** kcal/kg/km (4,334.7J/kg/km) at 9km/h

### Mechanical output :

To be able to estimate the real contribution of shoes, it is necessary to know the mechanical output *h* corresponding to the proportion of the energy cost used solely to in order to remain running.

The performance range for an average runner is between 18 and 24%. We have used the following values according to speed :

- ✓ *h* = 18% at 9 km/h
- ✓ *h* = 20% at 12 km/h
- ✓ *h* = 22% at 15 km/h
- ✓ *h* = 24% at 18 km/h

### Energy cost adjusted:

For a runner weighing 70 kg :

- ✓ **72752.1 J/km** at 18 km/h
- ✓ **66174.4 J/km** at 15 km/h
- ✓ **60100.0 J/km** at 12 km/h
- ✓ **54616.7 J/km** at 9 km/h

### Gains made to the Energy Cost:

To be able to compare the amount of energy provided by the springs, it is necessary to relate it to running for one kilometre. The stride amplitudes (*L*) considered for this are as follows :

- ✓ 1m at 9 km/h
- ✓ 1.2m at 12 km/h
- ✓ 1.5m at 15 km/h
- ✓ 1.75m at 18 km/h

The spring energy *E<sub>spring</sub>/km* provided by one kilometre of running is then deducted from the energy provided to each stride by:

$$E_{spring/km} = E_{spring} \cdot \frac{1000}{L}$$

### Gains provided by this Running shoe as a percentage of energy cost :

Speed	9km/h	12km/h	15km/h	18km/h
Total energy cost of running	303426 J/Km	300500 J/Km	300792 J/Km	303134 J/Km
Mechanical output of running	18%	20%	22%	24%
Adjusted energy cost	54616.7 J/km	60100.0 J/km	66174.4 J/km	72752.1 J/km
Energy provided by the springs <i>E<sub>ressort</sub> / km</i>	7603.2J/km	6336.0J/km	5068.8J/km	4344.7J/km
Energy gain provided by this modern running Shoe as a percentage of energy cost	13.92 %	10.54 %	7.66 %	5.97 %

We can see that the gains provided by the shock-absorbers in terms of mechanical energy is between 6% and 14% depending on the speed considered, and this is a significant advantage.

It is also interesting to note that the contribution of shock-absorbers is greater for running at low speeds since the number of strides per kilometre is higher.





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## Article

So, we can easily conclude that this shoe is extraordinary for today to guide the future of Sport shoe.

### Different types of sport shoes for different sports with special features :

#### High jump:



- This type of shoe has a much thicker sole. This gives maximum support and comfort.
- The shoe is light and flexible which helps the athlete achieve speed over a short distance before jumping
- This shoe has to have spikes. The spikes at the front help the athlete to gain speed in the run-up.
- The four spikes at the heel provide grip when the athlete takes off.

#### Javelin :



- This type of shoe has to be robust and durable.
- Athletes drag their feet along the ground during the throw.
- As a result the shoe has to be made from a tough, hardwearing material.

- Support is crucial. Javelin shoes look more like boots with protection around the ankle.
- Most of them feature strapping. This prevents the foot from moving in the shoe.



- This type of shoe has to be lightweight and offer flexibility at the front.
- They all tend to have spikes, which are located at the front.
- They are able to cope with lots of different types of surfaces.
- Most Olympic Athletes have their shoes specially made.

#### Conclusion :

- ❖ There are different types of sport shoes of different sports & the materials, designing, manufacturing processes of them are quite different because for different sports the body movements are different
- ❖ But main purpose of sport shoe designing is to give maximum comfort and balance of body in any situation
- ❖ So, these differences come with some unique and extraordinary technology.

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## Economic Corner

### **FINANCE BILL GETS PRESIDENTIAL ASSENT , TAKES EFFECT FROM 1<sup>ST</sup> APRIL**

For first-time Budget with taxation proposals have come into effect from first day of financial year

President Pranab Mukherjee has given his assent to the Finance Bill 2017 to give effect to provisions like bar on cash transactions above Rs 2 lakh and compulsory quoting of Aadhaar for filing tax returns.

"The President was kind enough to give his assent to the Finance Bill before he left for official visit to Assam yesterday," Revenue Secretary Hasmukh Adhia told PFI here. With this, the provisions of the Finance Bill come into effect from today, he said.

This is the first-time ever the annual Budget together with taxation proposals have come into effect from the first day of the financial year. Scrapping a colonial-era tradition of presenting the Budget at the end of February, Finance Minister Arun Jaitley had for the first time in the history of independent India presented the annual accounts on February 1.

The legislative process of getting approvals for demands for grants or spending, general Budget as well as taxation proposals contained in the Finance Bill 2017 were all completed by March 30. President's assent was taken the very next day.

This will give the government more time to implement welfare spending programmes and taxation plans.

Previously, when the Budget was presented at the end of February, the three-stage Parliament approval process used to get completed some time in mid-May, weeks ahead of onset of monsoon rains. This meant government departments would start spending only from August-end or September after the monsoon ends.

Besides advancing the presentation date, the Budget scrapped the Plan and non-Plan distinction and merged the Railway budget with it, ending a nearly century-long practice.

Advancement of the Budget will give government departments more leeway to spend as well as allow companies time to adapt to business and taxation plans.

Adhia said all taxation and other proposals in the Finance Bill 2017 have come into effect from today.

Among the most important is limiting cash transaction to Rs 2 lakh, at par with the current requirement of

quoting permanent account number (PAN) for cash spending.

Penalty for violating this is a fine equivalent to the amount of transaction, he said. The fine will be payable by the person or the establishment receiving the cash. Also, Aadhaar number is now a must while applying for PAN as well as filing of tax returns.

The Finance Bill also provides that a person holding PAN as on July 1, 2017, has to intimate his Aadhaar number to the authorities in a manner which will be notified by the government.

It also amends the Companies Act of 2013 to make donations by companies to electoral trusts only through account payee cheque, bank draft or electronic transfer.

The language has also been tweaked to provide for every company disclosing in its profit and loss account the total amount contributed to such trusts.

The move is in sync with Jaitley's Budget proposal of introducing bearer electoral bonds, which could be purchased by a donor using cheques from a scheduled bank and encashed only through a notified bank account of a political party within the limited duration of such instrument.

Adhia said rules for electoral bonds will be notified within this month.

The President's assent to the Finance Bill also means that as many as seven appellate tribunals will now be dissolved and their work taken over by other existing ones.

The tribunals scrapped include the Competition Appellate Tribunal, whose functions will be taken by the National Company Law Appellate Tribunal (NCLAT).

The Airports Economic Regulatory Authority Appellate Tribunal and the Cyber Appellate Tribunal will be replaced and their functions would be taken over by the Telecom Disputes Settlement and Appellate Tribunal (TDSAT).

Also, the Copyright Board will be dissolved and its functions will go to the Intellectual Property Appellate Board. The National Highways Tribunal will be replaced and its functions will be taken over by the Airport Appellate Tribunal while the job of the Employees Provident Fund Appellate Tribunal will be handled by the Industrial Tribunal.

*(Business Standard - 01/04/2017)*



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## Economic Corner

### PPF, SMALL SAVINGS RATE CUT FOR APRIL – JUNE QUARTER

The government has lowered the interest rates on small savings schemes like PPF, Kisan Vikas Patra and Sukanya Small saving schemes such as Public Provident Fund and Kisan Vikas Patra will earn lesser return by 0.1 per cent in the new financial year. The Finance Ministry has notified the interest rate for small saving schemes for the April to June quarter of 2017-18.

“On the basis of the decision of the government, interest rates for small savings schemes are to be notified on a quarterly basis,” the Ministry said on Friday while notifying the rates for the quarter starting April 1 and ending on June 30.

The return on the PPF and the Five-Year National Savings Certificate has been further lowered to 7.9 per cent from 8 per cent for the first quarter of the fiscal. The interest rate on the KVP has also been cut to 7.6 per cent from the earlier 7.7 per cent and it will now mature in 113 months as against 112 months previously.

For the April-June quarter, the Sukanya Samridhi Account Scheme will continue to earn the highest return. However, this has also been cut by 0.1 per cent to 8.4 per cent annually, from 8.5 per cent at present.

The interest rate on the five-year Senior Citizens Savings Scheme has been retained at 8.4 per cent as also for savings deposit at 4 per cent.

Term deposits of one year to five-year maturity will fetch a lower return ranging between 6.9 per cent and 7.7 per cent while the five-year recurring deposit has been pegged lower at 7.2 per cent.

*(Business Line – 01/04/2017)*

### INCOME TAX DEPARTMENT LAUNCHED E-FILING FACILITY FOR 2 ITRS

The Income-Tax Department today launched the e-filing facility for select Income Tax Returns (ITRs) for the assessment year 2017-18.

The two ITRs that are now available for filing on the e-portal of the department — <https://incometaxindiaefiling.gov.in> — are the ITR-1 ‘Sahaj’ and ITR-4 (Sugam).

The other five ITRs will soon be activated for filing on the e-portal, a senior officer said. The Central Board of Direct Taxes (CBDT) had yesterday launched all the seven ITRs for AY 2017-18, including the one-page simplified ITR-1 for salaried class and people having

income from one house and interest totalling up to Rs. 50 lakh.

Filing of these returns can be done till July 31

*(Business Line – 01/04/2017)*

### GDP GROWTH TO PICK UP AGAIN TO 7.6 % NEXT YEAR – DBS

India’s GDP growth is expected to pick up again to 7.6 per cent next year thanks to improving consumption, timely rains, higher public sector spending, and better export growth, says a DBS report.

India’s GDP growth is expected to pick up again to 7.6 per cent next year thanks to improving consumption, timely rains, higher public sector spending, and better export growth, says a DBS report. According to the global financial services major, the ongoing reforms will strengthen the productivity part of growth and the country’s GDP will benefit from India’s favourable working age population growth.

“Real GDP growth hit a road-bump this fiscal year. Cyclical forces are expected to shore up next year’s pace to 7.6 per cent,” DBS said in a research note.

The report said the benefits of structural reforms will, accrue more in the medium-term rather than in the short-term. Citing examples it said the Goods and Services Tax to be rolled out in July 2017 is a significant reform with long-term benefits despite the brief drag on growth after its launch.

“The timely implementation of other reforms will also be crucial in lifting the medium-term growth trajectory. This structural story will be strengthened by two domestic factors (demographic dividends and higher productivity), as well as a favourable external environment,” it said.

Moreover, India has one major advantage over G3 and many Asian economies – growth in its working age population is not peaking, DBS said adding a growing working age population is a necessary but insufficient condition for growth and this demographic dividend needs to be harnessed effectively.

“We see India’s ongoing cyclical upturn getting a hand from structural tailwinds. Provided the demographic dividend is harnessed effectively and productivity continues to improve on timely reforms, the structural story will be supportive of long-term growth prospects,” it said.





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## Economic Corner

### **FINANCE BILL GETS PRESIDENTIAL ASSENT , TAKES EFFECT FROM 1<sup>ST</sup> APRIL**

For first-time Budget with taxation proposals have come into effect from first day of financial year

President Pranab Mukherjee has given his assent to the Finance Bill 2017 to give effect to provisions like bar on cash transactions above Rs 2 lakh and compulsory quoting of Aadhaar for filing tax returns.

"The President was kind enough to give his assent to the Finance Bill before he left for official visit to Assam yesterday," Revenue Secretary Hasmukh Adhia told PTL here. With this, the provisions of the Finance Bill come into effect from today, he said.

This is the first-time ever the annual Budget together with taxation proposals have come into effect from the first day of the financial year. Scrapping a colonial-era tradition of presenting the Budget at the end of February, Finance Minister Arun Jaitley had for the first time in the history of independent India presented the annual accounts on February 1.

The legislative process of getting approvals for demands for grants or spending, general Budget as well as taxation proposals contained in the Finance Bill 2017 were all completed by March 30. President's assent was taken the very next day.

This will give the government more time to implement welfare spending programmes and taxation plans.

Previously, when the Budget was presented at the end of February, the three-stage Parliament approval process used to get completed some time in mid-May, weeks ahead of onset of monsoon rains. This meant government departments would start spending only from August-end or September after the monsoon ends.

Besides advancing the presentation date, the Budget scrapped the Plan and non-Plan distinction and merged the Railway budget with it, ending a nearly century-long practice.

Advancement of the Budget will give government departments more leeway to spend as well as allow companies time to adapt to business and taxation plans.

Adhia said all taxation and other proposals in the Finance Bill 2017 have come into effect from today.

Among the most important is limiting cash transaction to Rs 2 lakh, at par with the current requirement of

quoting permanent account number (PAN) for cash spending.

Penalty for violating this is a fine equivalent to the amount of transaction, he said. The fine will be payable by the person or the establishment receiving the cash. Also, Aadhaar number is now a must while applying for PAN as well as filing of tax returns.

The Finance Bill also provides that a person holding PAN as on July 1, 2017, has to intimate his Aadhaar number to the authorities in a manner which will be notified by the government.

It also amends the Companies Act of 2013 to make donations by companies to electoral trusts only through account payee cheque, bank draft or electronic transfer.

The language has also been tweaked to provide for every company disclosing in its profit and loss account the total amount contributed to such trusts.

The move is in sync with Jaitley's Budget proposal of introducing bearer electoral bonds, which could be purchased by a donor using cheques from a scheduled bank and encashed only through a notified bank account of a political party within the limited duration of such instrument.

Adhia said rules for electoral bonds will be notified within this month.

The President's assent to the Finance Bill also means that as many as seven appellate tribunals will now be dissolved and their work taken over by other existing ones.

The tribunals scrapped include the Competition Appellate Tribunal, whose functions will be taken by the National Company Law Appellate Tribunal (NCLAT).

The Airports Economic Regulatory Authority Appellate Tribunal and the Cyber Appellate Tribunal will be replaced and their functions would be taken over by the Telecom Disputes Settlement and Appellate Tribunal (TDSAT).

Also, the Copyright Board will be dissolved and its functions will go to the Intellectual Property Appellate Board. The National Highways Tribunal will be replaced and its functions will be taken over by the Airport Appellate Tribunal while the job of the Employees Provident Fund Appellate Tribunal will be handled by the Industrial Tribunal.

*(Business Standard - 01/04/2017)*



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### PPF, SMALL SAVINGS RATE CUT FOR APRIL – JUNE QUARTER

The government has lowered the interest rates on small savings schemes like PPF, Kisan Vikas Patra and Sukanya Small saving schemes such as Public Provident Fund and Kisan Vikas Patra will earn lesser return by 0.1 per cent in the new financial year. The Finance Ministry has notified the interest rate for small saving schemes for the April to June quarter of 2017-18.

“On the basis of the decision of the government, interest rates for small savings schemes are to be notified on a quarterly basis,” the Ministry said on Friday while notifying the rates for the quarter starting April 1 and ending on June 30.

The return on the PPF and the Five-Year National Savings Certificate has been further lowered to 7.9 per cent from 8 per cent for the first quarter of the fiscal. The interest rate on the KVP has also been cut to 7.6 per cent from the earlier 7.7 per cent and it will now mature in 113 months as against 112 months previously.

For the April-June quarter, the Sukanya Samridhi Account Scheme will continue to earn the highest return. However, this has also been cut by 0.1 per cent to 8.4 per cent annually, from 8.5 per cent at present.

The interest rate on the five-year Senior Citizens Savings Scheme has been retained at 8.4 per cent as also for savings deposit at 4 per cent.

Term deposits of one year to five-year maturity will fetch a lower return ranging between 6.9 per cent and 7.7 per cent while the five-year recurring deposit has been pegged lower at 7.2 per cent.

*(Business Line – 01/04/2017)*

### INCOME TAX DEPARTMENT LAUNCHED E-FILING FACILITY FOR 2 ITRS

The Income-Tax Department today launched the e-filing facility for select Income Tax Returns (ITRs) for the assessment year 2017-18.

The two ITRs that are now available for filing on the e-portal of the department — <https://incometaxindiaefiling.gov.in> — are the ITR-1 ‘Sahaj’ and ITR-4 (Sugam).

The other five ITRs will soon be activated for filing on the e-portal, a senior officer said. The Central Board of Direct Taxes (CBDT) had yesterday launched all the seven ITRs for AY 2017-18, including the one-page simplified ITR-1 for salaried class and people having

income from one house and interest totalling up to Rs. 50 lakh.

Filing of these returns can be done till July 31

*(Business Line – 01/04/2017)*

### GDP GROWTH TO PICK UP AGAIN TO 7.6 % NEXT YEAR – DBS

India’s GDP growth is expected to pick up again to 7.6 per cent next year thanks to improving consumption, timely rains, higher public sector spending, and better export growth, says a DBS report.

India’s GDP growth is expected to pick up again to 7.6 per cent next year thanks to improving consumption, timely rains, higher public sector spending, and better export growth, says a DBS report. According to the global financial services major, the ongoing reforms will strengthen the productivity part of growth and the country’s GDP will benefit from India’s favourable working age population growth.

“Real GDP growth hit a road-bump this fiscal year. Cyclical forces are expected to shore up next year’s pace to 7.6 per cent,” DBS said in a research note.

The report said the benefits of structural reforms will, accrue more in the medium-term rather than in the short-term. Citing examples it said the Goods and Services Tax to be rolled out in July 2017 is a significant reform with long-term benefits despite the brief drag on growth after its launch.

“The timely implementation of other reforms will also be crucial in lifting the medium-term growth trajectory. This structural story will be strengthened by two domestic factors (demographic dividends and higher productivity), as well as a favourable external environment,” it said.

Moreover, India has one major advantage over G3 and many Asian economies – growth in its working age population is not peaking, DBS said adding a growing working age population is a necessary but insufficient condition for growth and this demographic dividend needs to be harnessed effectively.

“We see India’s ongoing cyclical upturn getting a hand from structural tailwinds. Provided the demographic dividend is harnessed effectively and productivity continues to improve on timely reforms, the structural story will be supportive of long-term growth prospects,” it said.

**LEATHER  
SCIENCE  
ABSTRACTS**

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**VOLUME 50**

**NUMBER 03**

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**NATIONAL INFORMATION CENTER FOR LEATHER & ALLIED INDUSTRIES (NICLAI)  
NATIONAL INFORMATION SYSTEM FOR SCIENCE & TECHNOLOGY (NISSAT)**

**CENTRAL LEATHER RESEARCH INSTITUTE**  
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Leather Science Abstracts (**LESA**) is published by National Information Center for Leather and Allied Industries (**NICLAI**), Central Leather Research Institute (**CLRI**), Chennai.

It is a monthly abstracting periodical covering significant papers/articles published in the fields of Leather Science and Technology, Footwear Technology, Leatherware and Leathergoods, Leather chemicals, Leather machinery, Leather economics etc., appearing in about 500 scientific and technical periodicals published all over the world. The abstracts are presented under well defined subject headings and include indexes.

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All enquiries for further details should be addressed to: THE DIRECTOR, (**ATTN.: EDITOR, LESA**)  
CENTRAL LEATHER RESEARCH INSTITUTE, ADYAR, CHENNAI-600 020, INDIA.

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## LEATHER SCIENCE AND TECHNOLOGY

### LEATHER INDUSTRY, HISTORY, MANAGEMENT, ECONOMICS, EDUCATION.

#### 50.15347

Caught in the act? SETTER (S), (Leather Intl; 217, 4859; 2015, Apr.; 13-4).

It is very strongly doubted whether some people actually know the meaning of social responsibility as allegations made at the end of the last year still go unanswered. (1 Fig.).

#### 50.15348

Identity crisis. BAJPAI (D), (M/s. Bureau Veritas-India, 6<sup>th</sup> Floor, Marwah Center, Krishanlal Marwah Road, Opposite to Ansa Industrial Estate, Off. Saki Vihar Road, Andheri(East), Mumbai-440 072, India). (Leather Intl; 217, 4849; 2015, Apr.; 34-7).

Discusses the importance of knowing specifics about the material that one is buying in order to better maintain its longevity. Explains the many different types of leather available and how one can easily differentiate between various types. (7 Photos).

#### 50.15349

Proactive asset management-supporting lean business in India. VISHWANATHAN (K), (M/s. EquipNet (India) Private Limited, No. : 118, Blue Rose Industrial Estate, Western Express Highway, Borivali(East), Mumbai-400 066, India). (Chem. Wkly.; 60, 39; 2015, May, 5; 193-4).

Examines the case for a proactive approach to asset management by focusing on what can be achieved, the help available to make it happen and the economic gains that can accrue. (1 Fig.).

#### 50.15350

Indian surfactant & speciality chemicals industry. SINHA (S), (Fibres & Intermediates Sector, M/s. Reliance Industries Limited, Corporate Office, Maker Chambers-Phase IV, Nariman Point, Mumbai-400 021, India). (Chem. Wkly.; 60, 42; 2015, May, 26; 208-10).

Discusses the Indian speciality chemicals industry, challenges that pose the speciality chemicals industry, surfactant markets and the demand for innovative yet cost-effective products. (3 Photos).

#### 50.15351

Unseen fringes in the chlor-alkali market-is ethylene really a caustic soda price setter? NISHANTH REDDY (Y), (M/s. Beroe Consulting(I) Private Limited, ASV Chandilya Towers, Ground Floor, No. : 263/3, Rajiv Gandhi Salai, Thoraipakkam, Chennai-600 097, India). (Chem. Wkly.; 60, 36; 2015, Apr., 14; 203-6).

Ethylene and caustic soda have been found as two unrelated commodities coming from two different value chains and share a strange relationship, which many caustic soda buyers find amusing. It is found also that many large value consumers of caustic soda are perplexed when their suppliers increase caustic soda prices indicating ethylene price increases. The questions being asked whether the ethylene is really a price setter for caustic soda and if so, which are the critical ethylene market scenarios that a caustic soda buyer should be wary of and what can the buyer do to stand firm against price volatility in the ethylene market. (2 Tab.;5 Fig.).

#### 50.15352

Bio-refineries : Future technology and feedstocks challenges. RAJAGOPAL (R), (M/s. "Chemical Weekly", Corporate Office, No. : 602, 6<sup>th</sup> Floor, B-Wing, Godrej Coliseum, Behind Everard Nagar, Off. Eastern Express Highway, K.J. Somaiya Hospital Road, Sion (East), Mumbai-400 022, India). (Chem. Wkly.; 60, 27; 2015, Feb., 10;211-4).

It is stated that the development and optimization of new feedstocks generation technologies take time and will need huge investments by the industry to bring such platforms to the same level of fossil based platforms. Roadmap to address many of these issues are being developed by many countries.

Discusses the key barriers to taking products to market price relate to flexible bio-refinery models and competitiveness of bio-refineries, as improved chemistry, biology and chemical engineering skill sets. (2 Photos).





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**50.15353**

Biofuels and broader development challenges. (Chem. Wkly.; 60 26; 2015, Feb., 3; 203-11).

The importance, of bioenergy industries, is realized for all countries and is found in transformation particularly for developing countries. People in developing countries suffer the most from limited access to commercial energy, from outdoor and indoor air pollution and from the declining prices in traditional agricultural products. Discusses in detail about the development challenges in Africa, Land uses, production scales and commercial availability as well as the access to energy technology. (41 Ref.; 2 Tab.; 1 Fig.; 2 Photos).

**50.15354**

The new normal for palm & lauric oil prices in 2015. MISTRY (DE), (M/s. Godrej International Limited, Pirojshanagar, Eastern Express Highway, Vikhroli, Mumbai-400 079, India). (Chem. Wkly.; 60, 35; 2015, Apr., 7; 203-6).

Discusses that the year 2014 was a very bad year for producers though it had been declared as a great year for consumer of commodities. It was felt as very happy to say that some relief to palm oil producers is just round the corner. However, it is sadly viewed that after about six months, producers are sure to once again face challenges and will certainly need to focus on cost control and innovation. (3 Tab.; 3 Photos).

**50.15355**

Process intensification : Addressing pressures on cost, raw materials, energy and environment. (Chem. Wkly.; 60 38; 2015, Apr., 28; 210-2).

Discusses that the chemical, pharmaceutical, oil and gas industries are always looking for new products that are more effective than those they replace, or cheaper, more-environment-friendly routes to existing products despite their innate conservation. The development of a new process that can take up to a decade and it requires co-ordination between professionals from several different cultures, often spread across the globe. New computer simulation techniques work alongside traditional scientific and engineering creativity to develop safe, economic and sustainable manufacturing processes. (3 Photos).

**50.15356**

Modern process development : New challenges demand new processes. (Chem. Wkly.; 60, 37; 2015, Apr., 21; 208-10).

The chemical, pharmaceutical, oil and gas industries are always looking for new products that are more effective than those they replace or cheaper, more environment-friendly routes to existing products despite their innate conservatism. Assumes the development of a new process to take up to a decade and requires co-ordination between professionals from several different cultures, often spread across the globe. New computer simulation techniques work alongside traditional scientific and engineering creativity to develop safe, economic and sustainable manufacturing processes. (3 Photos).

**50.15357**

Quality assessment of chromatophores isolated from squid skin as natural pigment in formulation of lipstick. HASSAN (F), MUHAMED (PA), GEETHALAKSHMI (V), SANKAR (TV), (Central Institute of Fisheries Technology(CIFT), Indian Council of Agricultural Research(IACR),CIFT Junction, Willington Island, P.O. Matsyapuri, Cochin-682 029, Kerala State, India). (J. Sci. Ind. Res.; 74, 3; 2015, Mar.; 171-5).

Lipsticks are made to appeal to the current fashion trend and come in a range of colors. Lipstick is the only cosmetic ingested and because of this strict controls on ingredients, as well as the manufacturing processes, are imposed. As long as cosmetics remain in fashion, the market for lipstick will continue to be strong, adding markets in other countries as well as diversifying currently identified markets. But the pigments used in lipsticks can cause health hazards like infertility, anemia and cancer, as well as learning disabilities, mental retardation and behavioral problems, nausea, attention deficit, headache, skin irradiation, etc. The FDA(Food and Drug Administration) has laid strict regulations regarding the use of lead as a lipstick ingredient. In the present study, the chromatophores from squid skins were isolated and used as natural pigment in lipsticks. Fire shades (SQ<sub>1</sub>, SQ<sub>2</sub>, SQ<sub>3</sub>, SQ<sub>4</sub> and SQ<sub>5</sub>) were developed using this pigment and they were screened for consumer acceptance applying hedonic scale method(0 to 9). Comparison with the instrumental



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reading was also done for the sensory scores. The newly formulated lipstick(SQ<sub>2</sub>) was subjected to physical, chemical and microbiological quality evaluation. Compared the product with the commercially available lipstick brand and the new product was found to have superior properties when compared to the latter( $p < 0.01$ ). It was also found that the new product met with the national quality standards laid down for such category of products. The new product gives a way to utilize squid skin, which is not otherwise useful.(11 Ref.; 3 Tab.).

#### 50.15358

Laboratory automation : Complex solutions in modular design. BRINZ (T), (Lab Systems and Custom Solutions Division, M/s. Bosch Packaging Technology, No. : N4 A, Phase IV, Verna Industrial Estate, Verna, Salcute, Goa-403 722, India). (Chem. Wkly.; 60, 35; 2015, Apr., 7; 209-10).

Laboratory automation has significantly changed chemical and pharmaceutical research since the 1980. Complex automation and handling solutions provided by Bosch have proven successful in chemical laboratories for a long time. The concept of lab automation and handling of this company is currently transferring to the pharmaceutical market. The knowhow of this packaging and pharmaceutical form the basis for offering the pharmaceutical industry highly flexible, tailor-made solutions along the value chain. (1 Photo).

#### 50.15359

Alarms need attention not ignorance. YARDY (T), (M/s. Alarm and Operations Management, Honeywell Process Solutions, No. : 56 & 57, Hadapsur Industrial Estate, Pune-411 013, Maharashtra State, India). (Chem. Wkly.; 60, 40; 2015, May, 12; 206-8).

Discusses that the alarm management is imperative to improving and optimizing process alarms thereby increasing the effectiveness of the plant. Nuisance alarms, alarm floods and improperly prioritized alarms can lead to operator confusion, without an effective alarm program in place, thus increasing the risk of accidents. However, alarm management is not an one-time project but a continuous process. Knowing at once what an alarm means and how best to deal with it increase plant availability and productivity.

Adapting to an effective alarm management solution helps secure the investment made in the facility and also protect the individuals working there. Hence, it is very strongly stressed that the importance of constantly monitoring the alarm system while continuously improving and optimizing its performance. (1 Fig.).

#### 50.15360

Passage to India. (Leather Intl; 217, 4849; 2015, Apr.; 12).

The leather industry is known for its consistency in high export earnings and is among the top ten foreign-exchange earners for the country. It is also pertinent in the Indian economy regarding its substantial export earnings and growth, in addition to employing 2.5 million people, where 55% of the total workforce is below 35 and women make about 30%. Provides more details of the Indian leather industry. (1 Fig.).

#### 50.15361

Robust chemical preservation of digital information on DNA in silica both error-correcting codes. GRASS (RN), HECKEL (R), PUDDU (M), PAUNESCO (D), STARK (WJ), (Institute for Chemical and Bioengineering, ETH Zurich, Vladimir-Prelog Weg1, 8093 Zurich, Switzerland). (Angew.Chem.; 54, 8; 2015, Feb., 16; 2552-5).

Discusses the information, such as text printed on paper or images projected onto microfilm, can survive for over 500 years. However, the storage of digital information for time frames exceeding 50 years is challenging. It is shown here that digital information can be stored on DNA (deoxyribonucleoacid) and recovered without errors for considerably longer time frames. It is encapsulated that the DNA in an inorganic matrix and employ error-correcting codes to correct storage-related errors to allow for the perfect recovery of the information. It is translated specifically that 83 kB of information to 49991 DNA segments, each 158 nucleotides long, which were encapsulated in silica. Accelerated aging experiments were performed to measure DNA decay kinetics, which show that data can be achieved on DNA for millennia under a wide range of conditions. The original information could be recovered error free, even after treating the DNA in silica at 70°Centigrade for one week. This is thermally equivalent to storing information on DNA in central Europe for 2000 years. (27 Ref.; 8 Fig.; 1 Scheme).



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**50.15362**

Does Indian R&D need shock treatment? VENKATARAMAN (NS), (M/s. Nandini Consultancy Center, Thirumalainagar, Annexe, No. : 54, First Main Road, Perungudi, Chennai-600 096, India). (Chem. Wkly.; 60, 3; 2015, Apr., 7; 194).

Discusses the prominent importance of should be looking into functioning style of research institutions of both in private and public sector in India, by the Government of India and directing them to have appropriate targets for research in tune with the country's needs. Stresses very strongly on the needs, for the evaluations of their performance as profit centers.

**50.15363**

Lab automation : Scalable systems, integrative platforms and standardized interfaces. (Chem. Wkly.; 60, 39; 2015, May, 5; 211-3).

Time and cost pressure, a heterogeneous set of hardware, rapidly expanding data volumes and a diversity of data formats are typical of the Information Technology(IT) operating environment in automated lab workflows. A single uniform long term standard for pharmaceutical, biotechnology or clinical diagnostics is unlikely to emerge in the foreseeable future due to the involvement of highly complex, lab-specific tasks. Very firmly stresses a need for scalable systems, integrative platforms and standardized interfaces. (1 Tab.; 4 Photos).

**PROTEINS AND COLLAGEN****50.15364**

Under the skin.JOVANOSKI (D), (Leather Intl; 217, 4856; 2015, Nov./Dec.; 17). Looks at the structure and behavior of collagen during tannage. Reviews briefly about what tanning is all about.

**ENZYMOLOGY****50.15365**

Expanding the enzyme universe : Accessing non-natural reactions by mechanism-guided directed evolution. RENATA (H), WANG (ZJ), ARNOLD (FH), (Division of Chemistry and Chemical Engineering, California

Institute of Technology(CIT), 1200 East California Building MC 210-41, Pasadena, California 91125, USA). (Angew.Chem.; 54, 11; 2015, Mar., 11;3351-67).

Describes the high selectivity and exquisite control over the outcome of reactions that entice chemists to use biocatalysts in organic synthesis. However, many useful reactions are not accessible because they are not in nature's known repertoire. Outlines here about an evolutionary approach to engineering enzymes to catalyze reactions not found in nature. Begins with examples of how nature has discovered new catalytic functions and how such evolutionary progression has been recapitulated in the laboratory starting from extant enzymes. Then examines non-native enzymes activities that have been exploited for chemical synthesis, with an emphasis on reactions that do not have natural counterparts. Non-natural activities can be improved by directed evolution, thus mimicking the process used by nature to create new catalysts. Finally, describes the discovery of non-native catalytic functions that may provide future opportunities for the expression of the enzyme universe. (123 Ref.; 30 Fig.).

**50.15366**

The effect of enzyme pre-treatment for tannery sludge. LI (X), CHEN (J), JIA (J), (China Leather & Footwear Industry ResearchInstitute, No. : 18 Jiangtai West Road, Chaoyang District, Beijing – 100 016, China). (J. Soc. Leather Technol. Chem.; 99, 5; 2015, Sep.-Oct.; 255-8).

Describes some of the basic properties of tannery sludge which were examined by using Gas Chromatography-Mass Spectroscopy(GC-MS), atomic absorption spectrophotometry(AAS) and other methods. Studied the effect of enzyme pre-treatment for tannery sludge. The results showed that the alkaline protease 2709 and neutral protease As. 1398 can effectively promote the soluble chemical oxygen demand(COD) of tannery sludge. It can increase the rate of decomposition of organic matters by 23.01% and increase methane gas production by 144.89%. It is used together with ultrasound pre-treatment alkaline protease 2709 and can promote anaerobic digestion and increase the rate of decomposition of organic matter by 65.63% and gas production by 42.5%. (6 Ref.; 4 Tab.; 1 Fig.).



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**50.15367**

The Yin and Yang in the development of catalytic processes : Catalysts Research and Research Engineering. PRIETO (G), SCHÜTH (F), (Max Planck Institut für Kohlenforschung, Kaiser-Wilhelm-Platz 1, 45470 Mulheim an der Ruhr, Germany). (Angew.Chem.; 54, 9; 2015, Mar., 9; 3222-9).

Describes the catalyst development and reactor design and engineering that need to go hand-in-hand for the implementation of commercial catalytic processes. A co-evolution of catalysts and chemical reactors has historically been the right path towards successful, large-scale technologies as both fields are mutually interdependent. The contributions of BASF to the development of several commercial catalytic processes constitute perfect illustrations of this necessary and synergistic interplay between catalyst science and reactor engineering over the 150 years of its existence. (119 Ref.; 16 Fig.).

**50.15368**

*In situ* and theoretical studies for the dissociation of water on an active Ni/CeO<sub>2</sub> catalyst : Importance of strong-metal-support interactions for the cleavage of O-H bonds. CARRASCO (J), LOPEZ-DURAN (D), LIU (Z), DUCHON (T), EVANS (J), SENANAYAKE (SD), CRUMLIN (EJ), MATOLIN (V), RODRIGUEZ (JA), GANDUGLIA-PIROVANO (MV), (Instituto de Catalisis y Petroleoquimica, CSIC, C/Marie Curie 2, 28049 Madrid, Spain). (Angew.Chem.; 54, 13; 2015, Mar., 23; 3017-21).

Describes the water dissociation which is crucial in many catalytic reactions on oxide-supported transition-metal catalysts. The effect of the support on O-H (Oxygen-Hydrogen) bond cleavage activity is elucidated for nickel/ceria systems which is supported by experimental and density-functional theory results. Ambient-pressure O<sub>1s</sub> photoemission spectra at low Ni (Nickel) loadings on CeO<sub>2</sub>(111) reveal a substantially layer amount of OH groups as compared to the bare support. Computed activation energy barriers for water dissociation show an enhanced reactivity of Ni adatoms on CeO<sub>2</sub>(111) compared with pyramidal Ni<sub>4</sub> particles with one Ni atom not in contact with the support and extended Ni(111) surfaces. At the origin of this support effect is the ability of ceria to stabilize oxidized Ni<sup>2+</sup> species by accommodating electrons in localized f-states. The fast dissociation of water on

Ni/CeO<sub>2</sub> (Nickel/Cerium dioxide) has a dramatic effect on the activity and stability of this system as a catalyst for the water-gas shift and ethanol steam forming reactions. (34 Ref.; 5 Fig.).

**50.15369**

Synthesis of spiropyran by using silica-bonded *N*-propyldiethylenetriamine as recyclable basic catalyst. KIANFAR (F), MOGHADAM (SRM), KIANFAR (E), (M/s. Chimibaft Petrochemical Company, Mahshahr, Iran). (Indian J. Sci. Technol.; 8, 11; 2015, Jun.; 1-4).

Describes isatin and its derivatives that have been used as a precursor in some natural products due to the wonderful biological characteristics. One can raise the biocidal activity with the entity of two or more various heterocyclic moieties in one molecule. Reports the preparation of spirooxindole derivatives for developing new catalysts for organic transformations, which forms the continuation of this work. It forms the basis of this method by using the isatin reaction and malononitrile. Also, in this method, impressible and recyclable catalysts are silica-bonded *N*-propyldiethylenetriamine sulfonic acid. Result showed that, this method has many advantages like as simple work-up method, clean and facile procedure and environment friendly circumstance. (17 Ref.; 3 Tab.; 1 Fig.).

**LEATHER CHEMICALS AND AUXILIARIES****50.15370**

Industrial water management : Industry reduces its thirst for water. (Chem. Wkly.; 65, 33; 2015, Mar., 24; 209-11).

Resource conservation and economic considerations make it imperative to make intelligent "use" of industrial process water and to "consume" as little as possible. Water should not be transported, heated or contaminated more than is absolutely necessary to meet process needs. Water re-circulation and re-use are to crucial aspects of "smart water". (2 Photos).

**50.15371**

A convenient route to tetraalkylammonium-perfluoroalkoxides from hydrofluoroethers. JEFIER (BJ), HOWELL (JL), MONTGOMERY (CD), LEZNOFF (DB), FRIESEN (CM), (Department of Chemistry, Trinity Western University, 7600 Glover Road, Langley, British



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Columbia V27 1Y1, Canada). (Angew. Chem.; 54, 10; 2015, Mar., 2; 2945-9).

Describes hydrofluoroethers that are shown to alkylate tertiary amines readily under solvent-free conditions, affording valuable tetraalkylammoniumperfluoroalkoxides bearing  $\alpha$ -fluorines. The reaction of  $\text{RfCF}_2\text{-OCH}_3$  ( $\text{R}_f = \text{CF}_2\text{CF}_3$ ,  $\text{CF}_2\text{CF}_2\text{CF}_3$  and  $\text{CF}(\text{CF}_3)_2$ ) with  $\text{NR}^1\text{R}^2\text{R}^3$  produces twenty new  $\alpha$ -perfluoroalkoxides are easy to handle, thermally stable and can be used for the perfluoroalkylation of benzyl bromides. (72 Ref.; 2 Tab.; 3 Fig.; 3 Schemes).

### 50.15372

A tailor-made specific anion-binding motif in the side chain transforms a tetrapeptide into an efficient vector for gene delivery. LI (M), SCHLESIGER (S), KANAUER (SK), SCHMUCK (C), (Institute for Organic Chemistry, University of Duisburg-Essen 45117, Essen, Germany). (Angew.Chem.; 54, 10; 2015, Mar., 2; 2941-4).

Describes the arginine-rich cell-penetrating peptides that are widely utilized as vectors for gene delivery. However, their transfection efficacy still needs to be optimized. Introduces the guanidinecarbonylpyrrole groups, which are tailor-made anion binding sites to accomplish the optimization of their transfection efficacy into the side chains of tetralysine to obtain the peptide analogue **1**. This novel method most likely enhances transfection efficacy through more specific interactions between the binding motifs and DNA (deoxyribonucleoic acid) on the cell membrane in control to the common strategy of adding a lipophilic tail to peptide vectors. Tetrapeptide analogue **1** is thus the smallest peptide transfection vector that has been reported to date. The transfection efficacy **1**, which on average has less than two positive charges under physiological conditions, is even better than that of polyethylenimine (PEI). Furthermore, **1** exhibits only negligible cytotoxicity, which make it an interesting candidate for further development. (20 Ref.; 1 Tab.; 10 Fig.; 1 Scheme).

### 50.15373

Noncanonical amino acids to improve the pH response of pHLIP intersection at tumor activity. ONYNGO (JO), CHUNG (MS), KLEES (LM), LANGENBACHER (R), YAO (L), AN (M), (Department of Physics, Applied Physics and Astronomy, State University of New

York (SUNY), Binghamton University, P.O.Box 6000, Binghamton, New York 13902, USA). (Angew.Chem.; 54, 12; 2015, Mar., 16; 3658-63).

Describes the pH low insertion peptide (pHLIP) that offers the potential to deliver drugs selectively into the cytoplasm of cancer cells based on tumor acidosis. The WT pHLIP inserts into membranes with a  $\text{pH}_{50}$  of 6.1, while most solid tumors have extracellular  $\text{pH}(\text{pHe})$  of 6.5-7.0. A SAR study was carried out to search for pHLIP variants with improved pH response to close this gap. Replacing Asp25 with  $\alpha$ -aminoaciphic acid (Aad) adjusts the  $\text{pH}_{50}$  to 6.74, matching average tumor acidity and replacing Asp14 with  $\alpha$ -carboxylglutamic acid (Gla) increases the sharpness of pH response (transition over 0.5 instead of 1 pH unit). These effects are additive: the Asp14Gla/Asp.25Aad double variant shows a  $\text{pH}_{50}$  of 6.79, with sharper transition than Asp25Aad. Furthermore, demonstrated the advantage of the double variant over WT pHLIP in terms of cargo delivery in turn-on fluorescence assays and anti-proliferation studies (using paclitaxel as cargo) in A549 lung cancer cells at pH 6.6. (46 Ref.; 1 Tab.; 4 Fig.).

### 50.15374

Stabilization of collagen by cross-linking with a ferrous-gluconic acid compound. YANG (M), SHAN (M), ZHU (H), CHEN (H), (National Engineering Laboratory for Clean Technology of Leather Manufacture, Sichuan University, Wangjiang Campus, Section No. : 24 of Southern Yichuan, Chengdu-610065, Sichuan Province, China). (J. Soc. Leather Technol. Chem.; 99, 2; 2015, Mar.-Apr.; 91-4).

Describes the stabilization of type I collagen which is important to applications of collagen protein. Studied here about the stabilization of type I collagen with Fe (Iron)-gluconic acid by various methods such as ultraviolet-visible and infrared spectra, circular dichroism (CD) and differential scanning calorimetry (DSC) etc. Gluconic acid can form a compound with ferrous sulphate which can improve the thermal stability of type I collagen to an extent greater than that of Fe alone. The reaction molar ratio was 1:3 between Fe and gluconic acid. The increase of thermal stability is used to cross-link formation between the compound and collagen. (19 Ref.; 2 Tab.; 7 Fig.; 1 Scheme).



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**50.15375**

An affinity reagent for the recognition of pyrophosphorylated peptides. CONWAY (JH), FIEDLER (D), (Department of Chemistry, Princeton University, Washington Road, Princeton, New Jersey 08544, USA). (*Angew.Chem.*; 54, 13; 2015, Mar., 23; 3941-5).

Reports a resin-bound dinuclearzinc(II) complex for the selective capture of pyrophosphopeptides. The metal complex binds diphosphate esters over other anionic groups, such as monophosphate esters, sulfate esters, carboxylic acids, with high specificity. Immobilization of the compound provided a reagent capable of binding and retaining nanomolar quantities pyrophosphopeptide in the presence of cell lysate. The high affinity and specificity of the reagent makes it an attractive tool for the study of *in vivo* pyrophosphorylation. (65 Ref.; 1 Tab.; 6 Fig.; 1 Scheme).

**50.15376**

Manufacture of precipitated calcium carbonate. MAJUMDAR (S), (No. : H-701, Neel Padm Gunj Vaishali, Opposite to Dabur Chawk, Ghaziabad - 201 012, Uttar Pradesh State, India). (*Chem. Wkly.*; 60, 31; 2015, Mar., 10; 205-8).

Defines the term viz. : 'Filler' and briefly explains the various aspects on which these fillers very much depend and also two types of the fillers namely inorganic and organic fillers. Calcium carbonate is the last expensive and the largest mineral filler used in thermoplastic as well as thermoset compounds. Describes briefly about three types of calcium carbonate. Discusses about the differences between the precipitated calcium carbonate (PCC), and ground calcium carbonate and the uses of calcium carbonate in the swimming pools, construction, iron, oil and blackboard chalk industries. (2 Ref.; 1 Tab.; 1 Fig.).

**50.15377**

Artificial photosynthesis for sustainable fuel and chemical production. KIM (D), SAKIMOTO (KK), HONG (D), YANG (P), (Department of Chemistry, University of California, Berkeley, California 97420, USA). (*Angew.Chem.*; 54, 11; 2015, Mar., 9; 3259-66).

Discusses the apparent incongruity between the increasing consumption of fuels and chemicals and the finite amount of resources has led authors to seek means to maintain the sustainability of this society. Artificial photosynthesis, which utilizes sunlight to create high-value chemicals from abundant resources, is considered as the promising and viable method. Describes the progress and challenges in the field of artificial photosynthesis in terms of its key components such as the developments in photoelectrochemical water splitting and recent progress in electrochemical carbon dioxide reduction. Outlines the advances in catalysis, concerning the use of renewable hydrogen as a feedstock for major chemical production to shed light on the ultimate role of artificial photosynthesis in achieving sustainable chemistry. (70 Ref.; 10 Fig.).

**50.15378**

Quadruple switching of plated foldamers of tetrathiafulvalene-bipyridium alternating dynamic covalent polymers. CHEN (L), WANG (H), ZHANG (D), ZHOU (Y), LI (Z), (Department of Chemistry, Collaborative Innovation Center of Chemistry for Energy Materials(ichem), Fudan University, 220 Handan Road, Shanghai 200433, China). (*Angew.Chem.*; 54, 13; 2015, Mar., 23; 4028-31).

Describes two dynamic covalent polymers P1 and P2 that were prepared by alternatively linking electron-rich tetrathiafulvalene(TTF) and electron-deficient bipyridinium(BIPY<sup>2+</sup>) through hydrazine bonds. In acetonitrile, the polymers were induced by intramolecular donor-acceptor interactions to form pleated foldamers, which unfolded upon oxidation of the TTF units to the radical cation TTF<sup>•+</sup>. Reduction of the BIPY<sup>2+</sup> units to BIPY<sup>•+</sup> led to the formation of another kind of pleated secondary structures, which are stabilized by intramolecular dimerization of the BIPY<sup>•+</sup> units. The diradical dicationic cyclophane clobis (paraquat-*p*-phenylene) (CBPQT<sup>2(+)</sup>) could further force the folded structures to unfold by including the BIPY<sup>•+</sup> units of the polymers. Regenerated the first folded state upon oxidation of the BIPY<sup>•+</sup> units of the cyclophane and polymers to BIPY<sup>2+</sup> units of the cyclophane and polymers to BIPY<sup>2+</sup>. Confirmed the switching or conversion between the four conformational states by ultraviolet/Vis spectroscopic experiments.(60 Ref.; 5 Fig.).





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**50.15379**

Rapid and effective rewetting of dried wet-blue using a non-ionic oil. ZHOU (J), WANG (Y), LAN (Y), (National Engineering Laboratory for Clean Technology of Leather Manufacture, Sichuan University/Wenzhou University, Wangjiang Campus, Section No. : 24 of Southern Yichuan, Chengdu 6d10065, Sichuan Province, People's Republic of China). (Aqec Bol. Tecn.; 66, 2; 2015, Apr./May/Jun.; 25-32). (Spanish).

Rewetting of dried wet-blue is usually a difficult work for tanners. Describes a non-ionic oil(NIO) rewetting agent that had been prepared by mixing oil and non-ionic surfactants in proper mass ratio. Evaluated the re-wetting effect of NIO for dried bovine wet-blue by physical and chemical determinations. The results showed that a rapid and effective re-wetting of dried wet-blue obtained by using NIO as auxiliary agent and the optimized conditions were of using 1% NIO and remaining in 4400% water at 40°Centigrade for 2 hours. After rewetting, the dried wet-blue was fully wetted back in terms of thickness change, moisture content and softness. As a result, the uptake of the rewetted blue to dyestuffs and fatliquors were comparable with those of undried leather.

**50.15380**

Fascinating hydrogen atom transfer chemistry of alkenes inspired by problems in total synthesis. SIMONNEAU (A), OESTREICH (M), (Institut fur Chemie, TechnischeUniversitat Berlin, Strasse des 17, Juni 115, 10623 Berlin, Germany). (Angew.Chem.; 54, 12; 2015, Mar., 16; 3556-8).

Discusses the radical hydrofunctionalization alkenes that recently witnessed tremendous progress. The coupling of heteroatom-substituted alkenes was achieved by means of catalytic hydrogen atom transfer (HAT), thus enabling the construction of functionalized quaternary centers with unusual ease. Challenging thermodynamically controlled hydrogenations and isomerizations of alkenes as well as reductions of vinyl halides were accomplished using HAT processes. (15 Ref.; 6 Schemes).

**50.15381**

Intramolecular C-H activation through gold(±)-catalyzed reaction of iodoalkynes. MORAN-POLADURA

(P), RUBIO (E), GONZALEZ (JM), (Departamento de Quimica Organica e Inorganica and Instituto Universitario de Quimica Organometalica "Enrique Moles", Universidad de Oviedo, C/Julian Claveria 8, Oviedo, 33006, Spain). (Angew.Chem.; 54, 10; 2015, Mar., 2; 3052-5).

Describes the cycloisomerization reaction of 1-(iodoethynyl)-2(1-methoxyalkyl)arenes and related 2-alkyl-substituted derivatives gives the corresponding 3-iodo-1-substituted -1H-indene under the catalytic influence of 1Pr/AuNTf<sub>2</sub>(1Pr=1,3-bis(2,6-diisopropyl)phenylindazol-2-ylidene; NTf<sub>2</sub>=bis(trifluoromethanesulfonyl)imidate). The reaction takes place in 1,2-dichloroethane at 80°Centigrade and the addition of ttpb(2,4,6-tritert-butylpyrdimine) is beneficial to accomplish this new transformation in high yield. The overall reaction implies initial assembly of an intermediate gold vinylidene upon alkyne activation by gold(I) and a 1,2-iodine-shift. Deuterium labeling and crossover experiments, the magnitude of the recorded kinetic primary isotopic effects and the results obtained from the reaction of selected stereochemical probes strongly provide support for concerted insertion of the benzylic C-H(Carbon-Hydrogen) bond into gold vinylidene as the step responsible for the formation of the new carbon-carbon bond. (19 Ref.; 2 Tab.; 3 Schemes).

**50.15382**

Copper-catalyzed cyanomethylation of allylic alcohols with concomitant 1,2-aryl migration : Efficient synthesis of functionalized ketones containing an á-quaternary center. BUNESCU (A), WANG (Q), ZHU (J), (Laboratory of Synthesis and Natural Products, Institute of Chemical Sciences and Engineering, Ecole Polytechnique Federale de Lausanne, EPFL-SB-ISIC-LSPN, BCH 5304, 1015 Lausanne, Switzerland). (Angew.Chem.; 54, 10; 2015, Mar., 2; 3132-5).

Describes the development of a copper-catalyzed alkylation of allylic alcohols by alkyl nitriles with concomitant 1,2-aryl migration. Formation of the alkyl nitrile radicals was followed by its intramolecular addition to alkenes and the migration of a vicinal aryl group with the concomitant generation of a carboxyl functionality to complete the domino sequence. Mechanistic studies suggested that 1,2-aryl migration proceeded through a radical pathway(neophyl rearrangement). The protocol



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provided an efficient route to functionalized ketones containing an  $\alpha$ -quaternary center. (73 Ref.; 1 Tab.; 5 Schemes).

#### 50.15383

Asymmetric rhodium-catalyzed addition of thiols to allenes : Synthesis of branched allylic thioethers and sulfones. PRITZIUS (AB), BREIT (B), (Institut für Organische Chemie, Albert-Ludwigs-Universität Freiburg, Albertstrasse 21, 79104 Freiberg im Breisgau, Germany). (Angew.Chem.; 54, 10; 2015, Mar., 2; 3164-8).

Reports a highly regio- and enantioselective hydrothilation of terminal allenes, a reaction which fulfills the criteria of atom economy. A wide variety of thiols and allenes could be coupled by applying two chiral rhodium catalyst systems. Oxidation gave access to the corresponding allylic sulfones in essentially enantiomerically pure form. The reaction tolerates a variety of functional groups and labeling experiments gave first insights into the reaction mechanism of this new methodology. (100 Ref.; 4 Tab.; 1 Fig.; 4 Schemes).

#### 50.15384

Two-dimensional covalent organic frameworks for carbon dioxide capture through channel-wall functionalization. HUANG (N), CHEN (X), KRISHNA (R), JIANG (D), (Department of Materials Molecular Science, Institute for Molecular Science, National Institutes of Natural Sciences, 5-1 Higashiyama, Myodaiji, Okazaki 444-8787, Japan). (Angew. Chem.; 54, 10; 2015, Mar., 2; 2986-90).

Describes the ordered open channels that are found in two-dimensional covalent organic frameworks (2D COFs) that could enable them to adsorb carbon dioxide. However, the frameworks dense layer architecture results in low porosity that has thus far restricted their potential for carbon dioxide adsorption. Reports here a strategy for converting a conventional 2D COF into an outstanding platform for carbon dioxide capture through channel-wall functionalization. The dense layer structure enables the dense integration of functional groups on the channel walls, creating a new version of COFs with high capacity, reusability, selectivity and separation productivity for flue gas. These results suggest that channel-wall functional engineering could be a futile

and powerful strategy to develop 2D COFs for high performance gas storage and separation. (35 Ref.; 1 Tab.; 13 Fig.).

#### 50.15385

O<sub>2</sub>-mediated dehydrogenative amination of phenols. LOUILLAT-HABERMEYER (M), JIN (R), PATUREAU (FW), (FB Chemie, Technische Universität Kaiserslautern, Erwin-Schrodinger Str.52, 67663 Kaiserslautern, Germany). (Angew.Chem.; 54, 13; 2015, Mar., 23; 4102-4).

Describes a method that has been developed for the direct dehydrogenative construction of C-N (Carbon-Nitrogen) bonds between unprotected phenols and a series of cyclic anilines without resulting to any kind of metal activation of either substrate and without the use of halides. The resulting process relies on the exclusively organic activation of molecular oxygen and the subsequent oxidation of the aniline substrate. This allows the coupling of ubiquitous phenols, thus furnishing aminophenols through an atom-economical and most sustainable dehydrogenative amination method. This new reactivity, which relies on the intrinsic organic reactivity of cumene in what can be seen as a modified Hock activation process of oxygen, is expected to have a large impact on the formation of C-N bonds in organic synthesis. (38 Ref.; 3 Schemes).

#### 50.15386

Asymmetric hydroalkoxylation of non-activated alkenes : Titanium-catalyzed cycloisomerization of allylphenols at high temperatures. SCHLÜTER (J), BLAZEJAK (M), BOECK (F), HINTERMANN (L), (Department Chemie, Technische Universität München, Lichtenberstr.4, 85748 Garching bei München, Germany). (Angew.Chem.; 54, 13; 2015, Mar., 23; 4014-7).

Discusses the asymmetric catalytic addition of alcohols (phenols) to non-activated alkenes that has been realized through the cycloisomerization of 2-allylphenols to 2-methyl-2, 3-dihydrobenzofurans (2-methylcoumarans). The reaction was catalyzed by a chiral titanium-carboxylate complex at uncommonly high temperatures for asymmetric catalytic reactions. The catalyst was generated by mixing titanium isopropoxide-the chiral ligand ( $\alpha$ S)-1-(2-methoxy-1-naphthyl)-2-naphthoic acid or its derivatives and a co-catalytic amount of water in a ratio of 1:1:1 (5 mol%



each). This homogeneous thermal catalysis(HOT-CAT) gave various(s)-2-methylcoumarans with yields of up to 90% and in upto 85% ee(enatioexcess) at 240°Centigrade and in 87% ee at 220°Centigrade. (54 Ref.; 4 Tab.; 2 Fig.).

#### 50.15387

Significant enhancement in the efficiency and selectivity of iron-catalyzed oxidative cross-coupling of phenols by fluoroalcohols. GASTER (E), VAINER (Y), REGEV (A), NARUTE (S), SUDHEENDRAN (K), WERBELOFF (A), SHALIT (H), PAPO (D), (Department of Chemistry, Ben-Gurion University of the Negev, Beu-Sheva 84105, Israel). (Angew.Chem.; 54, 14; 2015, Mar., 27; 4198-202).

Discusses both the rate and the chemoselectivity of iron-catalyzed oxidative coupling of phenols with significant enhancement that can be achieved in fluorinated solvents such as 1,1,1,3,3,3-hexafluoropropan-2-ol (HFIP), 2,2,2-trifluoroethanol (TFE) and 1-phenyl-2,2,2-trifluoroethanol. Examined the generality of this effect for the cross-coupling of phenols with arenes and polycyclic aromatic hydrocarbons(PAHs) and of phenol with  $\alpha$ -dicarbonyl compounds. The new conditions were utilized in the synthesis of 2''-dehydroxycalodenin B in only four synthetic steps. (53 Ref.; 3 Tab.; 1 Fig.; 4 Schemes).

#### FINISHING MATERIALS

#### 50.15388

Phosphine-initiated cation exchange for precisely tailoring composition and properties of semiconductor nanostructures : Old concept, new applications. GUI (J), JI (M), LIU (J), XU (M), ZHANG (J), ZHU (H), (Research Center of Materials Science, School of Materials Science & Engineering, Beijing Institute of Technology, No. : 5 South Zhongguancun Street, Haidian District, Beijing 100081, People's Republic of China). (Angew.Chem.; 54, 12; 2015, Mar., 16; 3754-8).

Describes the phosphine-initiated carbon exchange as a well-known inorganic chemistry reaction. Discusses the different phosphines that have been used to modulate the thermodynamic and kinetic parameters of the cation exchange reaction

to synthesize complex semiconductor nanostructures. Besides preserving the original shape and size, phosphine-initiated cation exchange reactions show potential to precisely time the crystallinity and composition of metal/semiconductor core-shell and doped nanocrystals. Furthermore systematically studied the different phosphines and on the elementary reaction mechanisms. (43 Ref.; 1 Tab.; 16 Fig.).

#### 50.15389

Excimers beyond pyrene : A far-Red optical proximity reporter and its application to the label-free detection of DNA. HAN (G), KIM (D), PARK (Y), BOUFFARD (J), KIM (Y), (Department of Chemistry and Nano Science(BK 21 Plus), EwhaWomavs University, 52 Whayeodae-gil, Seodaemun-gu, Seoul 120-750, Korea). (Angew. Chem.; 54, 13; 2015, Mar., 23; 3912-6).

Reports a family of organic chromophores that, like pyrene, forms emissive excimers. Their chemical and photophysical properties are superior to pyrene for the design of chemo- and biosensors. Their polar dyes absorb strongly in the visible range and their excimers emit brightly in the red to far-red region of the electromagnetic spectrum unlike hydrophobic pyrene, which requires excitation by cell-damaging ultraviolet irradiation. The intensity of the emission signal is greatly increased upon formation of a preassociated dimer that is triggered upon aggregation or crystallization. Reports also a probe that is capable of detecting label-free deoxyribonucleoroacid (DNA) in water down to 10 pM and also doubles as a visualization agent for DNA in gel electrophoresis in demonstration of the potential of this new family of excimer-forming dyes. (52 Ref.; 2 Tab.; 11 Fig.).

#### 50.15390

Applications of ion chromatography in the leather sector-Part I. PEREZ (C), REYES (M), PASCUAL (N), (Esculad'Enginyeriad'Igualada(UPC Barcelona Tech),Placa del Rei, 08700,Igualada, Barcelona, Catalunya, Spain). (Aqeic Bol. Tec.; 66, 2; 2015, Apr. /May/Jun.;19-24). (Spanish).

Describes the determination of the anionic impurities in dyes, tannins extracts and naphthalene sulfonic dispersants. Likewise, quantified the commercial formic acids and analyzed the anionic content of tunable hide samples. Checked the efficiency of the



extraction process anions from the leather in accordance with the UNE-EN ISO 4098 : 2006(IUC 6) Standard. It was confirmed that the shaking rate must be increased up to  $170 \pm 10$  rpm. It was also concluded that a single extraction is not enough to quantify the total anion content in leather and in some cases, recommended multiple extractions. It has been observed that in some complex samples of leather, the formate anion is difficult to quantify. This is due to that formate and phosphate anions have similar retention times in the chromatography with indirect detection.

#### 50.15391

Applications of ion chromatography in the leather sector-Part II. PEREZ (C), REYES (M), PASCUAL (N), (Escuela de Ingeniería de Igualada (UPC Barcelona Tech), Placa del Rei, 08700, Igualada, Barcelona, Spain). (Aqueic Bol. Tecn.; 66, 3; 2015, Jul./Aug./Sep.; 41-50). (Spanish).

This part of the article is the continuation of the previous report and this section includes the determination of anions by ion chromatography and direct ultraviolet detection/influence of the main factors that have effect on the separation and selection of the chromatographic conditions. Evaluated the factors like temperature and composition of mobile phase (concentration of acetonitrile, pH and concentration of potassium biphthalate).

#### 50.15392

Highly fluorescent and water-soluble diketopyrrolopyrrole dyes for bioconjugation. HEYER (E), LORY (P), LEPRINCE (J), MOREAU (M), ROMIEU (A), GUARDIGLI (M), RODA (A), ZIESSEL (R), (Institut de Chimie Moléculaire de l'Université de Bourgogne UMR CNRS 6302, Université de Bourgogne, 9 Avenue Alain Savary, 21078 Dijon, France). (Angew. Chem.; 54, 10; 2015, Mar., 2; 2995-9).

Describes the preparation of highly water-soluble and strongly fluorescent diketopyrrolopyrrole (DPP) dyes that have been achieved by using an unusual taurine-like sulfonated linker. Exchanging a phenyl for a thienyl substituent shifts the emission wavelength to near  $\lambda = 600$  nm. The free carboxylic acid group present in these new derivatives was readily activated and the dyes were subsequently covalently linked to a model protein (bovine serum albumin; BSA).

The bioconjugates were characterized by electronic absorption, fluorescence spectroscopy and matrix-assisted laser desorption ionization time-of-flight (MALDI-TOF) mass spectrometry, thus enabling precise determination of the labeling density (ratio DPP/BSA about 3 to 8). Obtained the outstanding values of fluorescence quantum yield (30% to 59%) for these bioconjugates. The photostability of these DPP dyes is considerably greater than that of fluorescein under the same irradiation conditions. Remarkably low detection limits between 80 and 300 molecules/ $\mu\text{m}^2$  were found for the BSA bioconjugates by fluorescence imaging with an epifluorescence microscope. (35 Ref.; 2 Tab.; 3 Fig.).

#### 50.15393

Plumbonacrite identified by X-ray powder diffraction tomography as a missing link during degradation of red lead in a Van Gogh painting. VANMEERT (F), SNICKET (Gvd), JANSSENS (K), (Antwerp X-ray analysis, Electrochemistry and Speciation, University of Antwerp, Groenenborghlaan 171, 2020 Antwerp, Belgium). (Angew. Chem.; 54, 12; 2015, Mar., 16; 3607-10).

Describes Red lead, a semiconductor pigment used by artists since antiquity, is known to undergo several discoloration phenomena. These transformations are either described as darkening of the pigment caused by the formation of either plattnerite ( $-\text{PbO}_2$ ) or galena ( $\text{PbS}$ ) or as whitening by which red lead is converted into anglesite ( $\text{PbSO}_4$ ) or (hydro)cerussite ( $2\text{PbCO}_3 \cdot \text{Pb}(\text{OH})_2$ ;  $\text{PbCO}_3$ ). X-ray powder diffraction tomography (XPDT), a powerful analytical method that allows visualization of the internal distribution of different crystalline compounds in complex samples, was used to investigate a microscopic paint sample from a Van Gogh painting. A very rare lead mineral, plumbonacrite ( $3\text{PbCO}_3 \cdot \text{Pb}(\text{OH})_2 \cdot \text{PbO}$ ), was revealed to be present. This is the first reported occurrence of this compound in a painting dating from before the mid 20<sup>th</sup> Century. It constitutes the missing link between on the one hand the photoinduced reduction of red lead and on the other hand (hydro)cerussite and thus shed new light on the whitening of red lead. (30 Ref.; 8 Fig.; 1 Scheme).

#### 50.15394

apid formation of a supramolecular polypeptide-DNA hydrogel for *in situ* three-dimensional multilayer



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bioprinting. LI (C), FAULKNER-JONES (A), DUN (AR), JIN (J), CHEN (P), XING (Y), YANG (Z), LI (Z), SHU (W), LIU (D), DUNCAN (RR), (Institute of Biological Chemistry, Biophysics and Bioengineering, Heriot-Watt University, Edinburgh EH14 4AS, England). (Angew.Chem.; 54, 13; 2015, Mar., 23; 3457-61).

Describes a rapidly formed supramolecular polypeptide-DNA(deoxyribonucleoacid) hydrogel that was prepared and used for *in situ* multilayer three-dimensional bioprinting for the first time. Designed structures can be printed by alternative deposition of two complementary bio-inks. The printed structures are geometrically uniform without boundaries and can keep their shapes up to the millimeter scale without collapse, based on their healing properties and high mechanical strengths. Demonstrated the 3D (Three Dimension) cell printing to fabricate live-cell-containing structures with normal cellular functions. The hydrogel, together with the unique properties of biocompatibility, permeability and biodegradability, becomes an ideal biomaterial for 3D bioprinting to produce designate 3D constructs for applications in tissue engineering. (54 Ref.; 11 Fig.; 1 Scheme).

#### 50.15395

An efficient approach to chiral allyloxyamines by stereospecific allylation of nitrosoarenes with chiral allylboronates. LI (Y), CHAKRABARTY (S), STUDER (A), (Organisch-Chemisches Institut, Westfälische Wilhelms-Universität, Correnstrasse 40, 48149 Münster, Germany). (Angew.Chem.; 54, 12; 2015, Mar., 16; 3587-91).

Describes a novel and efficient approach to allyloxyamines by the allylation of nitrosoarenes with  $\alpha$ -chiral allylboronates. C-O(Carbon-Oxygen) bond formation occurs with high stereospecificity and the product allyloxyamines are easily transformed into valuable chiral building blocks such as isoxazolidines and allylic alcohols. The reaction features complete regioselectivity(O-selectivity) high E/Z selectivity and excellent chirality transfer. (55 Ref.; 3 Tab.; 4 Schemes).

#### 50.15396

Study of thermal properties of mixed(PP/EPR)/calcium carbonates. ANICET (NPM), LOUIS-MAX (AO), ROLAND (EM), SALEM (C), MERLIN (AZ), (Laboratory of

Mechanics, Materials, Structure and Production, University of Douala, Carrefour Ange Raphael, Douala, Cameroon). (Indian J. Sci. Technol.; 8, 11; 2015, Jun.; 1-8).

Aims for the mixtures that are to be carried out with a micro twin screw then the internal mixer HAAKE Poly Lab System. The mixtures consist of copolymer(PP/EPR) (Polypropylene/ethylene-propylene rubber) and socal312 calcium carbonates, socal322v or Winnofilspm, each at levels of % and 10%; then one performs thermal tests by dynamic scanning calorimetry(DSC) and compares the results for all blends with those of the copolymer(PP/EPR) alone, in order to identify possible changes in properties. However, it is important to present the different components and facilities used for a rigorous comparative study of the thermal properties of the mixtures. (18 Ref.; 7 Tab.; 10 Fig.).

#### 50.15397

Tunable photoluminescence across the entire visible spectrum from carbon dots excited by white light. HU (S), TRINCHI (A), ATKIN (P), COLE (I), (School of Material Science and Engineering, North University of China, Taiyuan 030051, People's Republic of China). (Angew.Chem.; 54, 10; 2015, Mar., 2; 2970-4).

Although reports have shown shifts in carbon dot emission wavelengths resulting from varying the excitation-dependent emission does not constitute true turning as the shifted peaks have much weaker intensity than their dominated emission and this is often undesired in real world applications. Here, reports for the first time the synthesis and photoluminescence properties of carbon dots whose peak fluorescence emission wavelengths are tunable across the entire visible spectrum by simple adjustment of the reagents and synthesis conditions and these carbon dots are excited by white light. Detailed material characterization has revealed that this tunable emission results from changes in the carbon dots' chemical composition, dictated by dehydrogenation reactions occurring during carbonization. These significantly alter the nucleation and growth process, resulting in dots with either-more oxygen-containing or nitrogen-containing groups that ultimately determine their photoluminescence properties, which is in stark contrast to previous observations of carbon dot excitation-dependent





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fluorescence. This new ability to synthesize broadband excitable carbon dots with tunable peak emission opens up many new possibilities, particularly in multimodal sensing, in which multiple analytes and processes could be monitored simultaneously by associating a particular carbon dot emission wavelength to a specific chemical process without the need for tuning the excitation source. (34 Ref.; 19 Fig.).

## BY-PRODUCTS

### 50.15398

Synthetic membranes for water purification : Status and future. FANE (AG), WANG (R), HU (MX), (Singapore Membrane Technology Center, Nanyang Environmental & Water Research Institute, Nanyang Technological University, Main Campus, 550 Nanyang Avenue Singapore 639 798, Singapore). (Angew.Chem.; 54, 11; 2015, Mar., 9; 3368-86).

Describes the membrane technology that offers the best options to "drought proof" mankind on an increasingly thirsty planet by purifying seawater or used(waste) water. Although desalination by reverse osmosis(RO) and wastewater treatment by membranes bioreactors are well established the various membrane technologies still need to be significantly improved in terms of separation properties, energy demand and costs. Now, defines the ideal characteristics of membranes and advances in material science and novel chemistries are leading to increasingly effective membranes. However, developments in membranes must be matched by improved device design and membrane engineering. It is likely that limitations in fluid mechanics and mass transfer will define the upper bounds of membrane performance. Nevertheless major advances and growth over the next 20 years can be anticipated with RO remaining as the key to desalination and reclamation, with other membrane processes growing in support and in niche areas. (293 Ref.; 3 Tab.; 16 Fig.).

### 50.15399

Inducing recharge of groundwater by treated waste water-A pilot study in Southern Chennai Metropolitan area. PACKIALAKSHMI (S), BALAJI (S), KUMARESAN (T), (Department of Civil Engineering, Sathyabama University, Jeppiaar Nagar, Rajiv Gandhi Salai(Old Mahabalipuram Road), Chennai-600 109, India).(Indian J. Sci. Technol.; 8, 11; 2015, Jun.; 1-7).

Describes the designed artificial recharge structure using waste water generated within the living space. Thus, it aims to utilize the treated domestic effluent as a main source for artificial recharge technique. This may increase the water use efficiency by the approach of conjunctive use of surface water and groundwater thereby reduce the demand for freshwater resources. (16 Ref.; 3 Tab.; 3 Fig.).

### 50.15400

A general and mild catalytic  $\alpha$ -alkylation of unactivated esters using alcohols. GUO (L), MA (X), FANG (H), JIA (X), HUANG (Z), (State Key Laboratory of Organometallic Chemistry, Shanghai Institute of Organic Chemistry, No. : 345 Lingling Road, Shanghai 200032, China). (Angew.Chem.; 54, 13; 2015, Mar., 23; 4023-7).

Describes the catalytic  $\alpha$ -allylation of esters with primary alcohols as a desirable process because it uses low-toxicity agents and generates water as the by-product. Reports here about a NCP(National Chemical Products) pincer/Ir catalyst which is highly efficient for  $\alpha$ -allylation of a broad scope of unactivated esters under mild reaction conditions. Alcohols alkylate unactivated  $\alpha$ -substituted acyclic esters, lactones and every methyl and ethyl acetates. This method can be applied to the synthesis of carboxylic acid derivatives with diverse structures and functional groups, some of which would be impossible to access by conventional enolate alkylations with alkyl halides. (52 Ref.; 1 Tab.; 1 Fig.; 4 Schemes).

### 50.15401

Recent approaches for the direct use of elemental sulfur in the synthesis and processing of advanced materials. KIM (J), PYUN (J), CHAR (K), (National Creative Research Initiative Center for Intelligent Hybrids, WCU Program of Chemical Convergence for Energy and Environment, School of Chemical and Biological Engineering, Seoul National University, Gwanakro 599, Gwanak-gu, Seoul d151-742, Republic of Korea). (Angew.Chem.; 54, 11; 2015, Mar., 9; 3249-58).

Describes the elemental sulfur as an abundant and inexpensive material obtained as a by-product of natural gas and petroleum refining operations. Recently, the need for the development of new energy-storage systems brought into light the potential



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of sulfur as a high-capacity cathode material in secondary batteries. These developments coupled with growing environmental concerns related to the global production of excess elemental sulfur have led to a keen interest in its utilization as a feedstock in materials applications. Focuses the recent developments on physical and chemical methods for directly processing elemental sulfur produce functional composites and polymers. (127 Ref.; 18 Fig.; 3 Schemes).

#### 50.15402

Last-stage fluorination : Fancy novelty or useful tool? NEUMANN (CN), RITLER (T), (Department of Chemistry and Chemical Biology, Harvard University, No. : 12 Oxford Street, Cambridge, Massachusetts 02138, USA). (Angew.Chem.; 54, 11; 2015, Mar., 9; 3216-21).

Examines the recent surge in late-stage fluorination reactions and outlines challenges that need to be overcome to increase the impact of modern fluorination methods on the synthesis of complex organofluorine compounds. It is outlined how an improved understanding of the bonding interactions of fluoride would lead to a new class of mild fluorinating reagents and a range of functional tolerant reactions. (152 Ref.; 1 Scheme).

#### 50.15403

A heterobimetallic superoxide complex formed through O<sub>2</sub> activation between chromium(III) and a lithium cation. SCHAX (F), SUHR (S), BILL (E), BRAUN (B), HERWIG (C), LIMBERG (C), (Humboldt-Universität zu Berlin, Institut für Chemie, Brook-Taylor-Strasse 2, 12489 Berlin, Germany). (Angew.Chem.; 54, 4; 2015, Jan., 19; 1352-6).

Discusses the reaction of 1,1,3,3-tetraphenyl-1,3-disiloxandiol(LH<sub>2</sub>) with *n*-butyllithium and CrCl<sub>2</sub>(O) which results in a mononuclear chromium(II) complex(1) that further reacts with O<sub>2</sub> at low temperatures to yield a mononuclear chromium(III) superoxide complex [L<sub>2</sub>CrO<sub>2</sub>(THF)] [Li<sub>2</sub>(THF<sub>3</sub>)<sub>3</sub>](2). The crystal structure revealed that the chromium superoxido entry is stabilized by the coordination to an adjacent lithium cation. Complex 2 thus contains an unprecedented heterobimetallic [Cr<sup>III</sup>/-O<sub>2</sub>)Li<sup>+</sup>] core; beyond this it is the first chromium superoxide for which a temperature-dependent magnetic characterization could be achieved and the

first structurally characterized representative with chromium in an exclusive O-door environment. (34 Ref.; 4 Fig.; 4 Schemes).

### TANNERY. ENVIRONMENTAL ASPECTS

#### 50.15404

Advanced biotechnology : Metabolically engineered cells for the bio-based production of chemicals and fuels, materials and health-care products. BECKER (J), WITTMANN (C), (Institute of Systems Biotechnology, Saarland University, Campus A1.5, 66123 Saarbrücken, Germany). (Angew.Chem.; 54, 11; 2015, Mar., 9; 3328-50).

Reviews *Corynebacterium glutamicum*, *Escherichia coli* and *Saccharomyces cerevisiae* in particular, that have become established as important industrial workhouses in biotechnology. Recent years have tremendous progress in their advance into tailor-made producers, driven by the upcoming demand for sustainable processes and renewable raw materials. Here, the diversity and complexity of nature is simultaneously a challenge and a benefit. Harnessing biodiversity in the right manner through synergistic progress in systems metabolic engineering and chemical synthesis promises a future innovative bio-economy. (426 Ref.; 6 Fig.).

#### 50.15405

Biodegradable and bio-based polymers : Future prospects of eco-friendly plastics. IWADA (T), (Laboratory of Science of Polymeric Materials, Department of Biomaterial Sciences, Graduate School of Agricultural and Life Sciences, The University of Tokyo, 1-1-1 Yayoi, Bunkyo-ku, Tokyo 113-8657, Japan). (Angew.Chem.; 54, 11; 2015, May, 9; 3210-5).

Describes the currently used plastics that are produced from petrochemical products, but there is a growing demand for eco-friendly plastics. The use of bio-based plastics, which are produced from renewable resources and biodegradable plastics, which are degraded in the environment, will lead to a more sustainable society and helps one to solve global environmental and waste management problems. (22 Ref.; 1 Tab.; 15 Fig.).



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## LEATHER PRODUCTS

## FOOTWEAR

### 50.15406

The year of the pig. JOVANSKI (D), (Leather Intl; 217, 4849; 2015, Apr.; 16 & 18).

Pigskin remains largest potential raw material resources to be used by the leather industry worldwide. It is explained that why this product should be duly considered by the industry and how to distinguish the right raw material and process for the job. (1 Photo).

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