

Chemical and Materials Industry Dynamic Briefing

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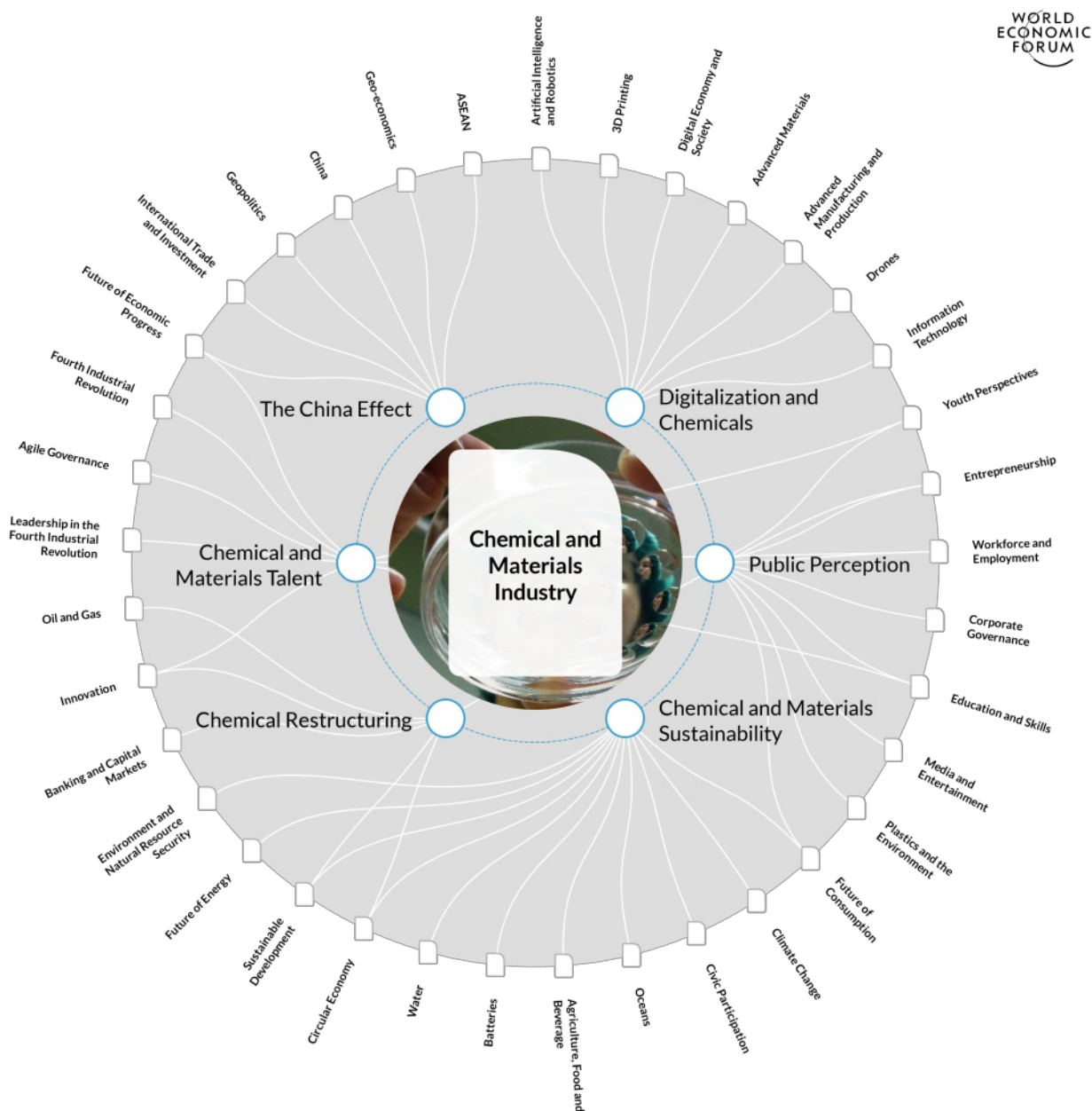
Chemical and Materials Industry

Co-curated with [IMD Business School](#)

Last review on Wed 08 August 2018

About

This dynamic briefing draws on the collective intelligence of the Forum network to explore the key trends, interconnections and interdependencies between industry, regional and global issues. In the briefing, you will find a visual representation of this topic (Transformation Map – interactive version available online via intelligence.weforum.org), an overview and the key trends affecting it, along with summaries and links to the latest research and analysis on each of the trends. Briefings for countries also include the relevant data from the Forum’s benchmarking indices. The content is continuously updated with the latest thinking of leaders and experts from across the Forum network, and with insights from Forum meetings, projects communities and activities.



Executive summary

The chemical and materials industry is expected to see global sales grow to €6.3 trillion by 2030 from €3.4 trillion in 2016, according to the European Chemical Industry Council. The sector is developing ways to both bolster its environmental sustainability, and to help others improve their own ecological profiles. Its centre of gravity has been shifting decidedly to the East, as China captures a larger share of chemical sales and feeds massive infrastructure and manufacturing initiatives. Challenges for the industry include a need to improve its public image, and to leverage new technology developments for maximum benefit.

This briefing is based on the views of a wide range of experts from the World Economic Forum's Expert Network and is curated in partnership with Dr. Georges Haour, professor of technology & innovation management at IMD International.

1. Digitalization and Chemicals

Innovation is creating opportunities for the chemicals sector to transform other industries, and itself.

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Negative public perception poses risks for the chemical and materials sector.

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The industry has to revamp its workforce, and better attract fresh talent.

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Chinese chemical and materials firms are investing in innovation, and progressing.

Digitalization and Chemicals

Innovation is creating opportunities for the chemicals sector to transform other industries, and itself

As it did in previous industrial revolutions, the chemical and materials industry is playing a major enabling role in the Fourth Industrial Revolution. It is largely through the industry's contributions that other sectors can turn their innovative ideas into products like touch screens, rechargeable batteries in portable devices, organic light-emitting diodes in flexible electronics, or the lightweight materials used to build drones. At the same time, the industry itself is being transformed through digitalization. Previously, the industry made use of digital technologies for process optimization and efficiency. Now, the digitalization of chemicals companies has expanded to focus on everything from the laboratory, to marketing and sales (through the extension of traditional product offerings with digital components), and new means of interaction with customers.

The chemical and materials sector is generally seeking to stay abreast of pockets of digital disruption, including digitally-accelerated biotechnology that enables the direct-route production of chemicals, and the disintermediation of players from platforms. For example, large multinationals in the sector like BASF, Evonik, Covestro, and Solvay have launched online stores on Alibaba's B2B platform 1688.com. Meanwhile startups such as ChemSquare, a global B2B matching platform for buyers and sellers of raw materials and ingredients used in food, pharmaceuticals, cosmetics, and animal nutrition, may disrupt the industry's traditional procurement and sales processes. On the research and development side, companies such as BASF, Dow Chemical, and Evonik have announced partnerships with IBM and Hewlett-Packard related to data management, machine learning, and quantum computing technologies that could accelerate innovation. As the timing and scale of digital disruption is hard to predict, the industry operates with an awareness that it could be fundamentally altered at any time.

Related insight areas: [Advanced Manufacturing and Production](#), [Information Technology](#), [3D Printing](#), [Drones](#), [Advanced Materials](#), [Artificial Intelligence and Robotics](#), [Digital Economy and Society](#)



[Ecole Polytechnique Fédérale de Lausanne](#)
**Portable device helps doctors
 diagnose sepsis faster**

22 January 2020

22.01.20 - EPFL researchers have developed a highly sensitive and portable optical biosensor that stands to accelerate the diagnosis of fatal conditions like sepsis. It could be used by ambulances and hospitals to improve the triage process and save lives. Sepsis claims one life every four seconds. It is the primary cause of death in hospitals, and one of the ten leading causes of death worldwide. Sepsis is associated with the body's inflammatory response to a bacterial infection and progresses extremely rapidly: every hour that goes by before it is properly diagnosed and treated increases the mortality rate by nearly 8%. Time is critical with sepsis, but the tests currently used in hospitals can take up to 72 hours to provide a diagnosis. Many scientists are working on this critical issue, including those at Abionic, an EPFL spin-off.



[World Economic Forum](#)
**The business case for investing in
 sustainable plastics**

20 January 2020

A conversation between the World Economic Forum's Global Plastic Action Partnership and Audrey Choi, Head of Global Sustainable Finance at Morgan Stanley.



[Science Daily](#)
**Lights on for germ-free wound
 dressings: Biomimetic hydrogel with
 photodynamic antimicrobial effect**

16 January 2020

Infections are a dreaded threat that can have fatal consequences after an operation, in the treatment of wounds, and during tissue engineering. Biomimetic hydrogels with 'built-in' antimicrobial properties can significantly decrease this danger. Scientists have now introduced a gel that is activated by red light to produce reactive oxygen compounds that effectively kill bacteria and fungi.



[Wharton School of the University of
 Pennsylvania - Knowledge@Wharton](#)
**Sustaining Sustainability: How Small
 Actions Make a Big Difference**

13 December 2019

Corporate social responsibility (CSR) and sustainability need to be strategic in order to benefit firms and society, says C. B. Bhattacharya, author of 'Small Actions, Big Difference.'



[Ecole Polytechnique Fédérale de Lausanne](#)
**Combining science and design to
 measure our exposure to light**

12 December 2019

12.12.19 - Daylight plays an essential role in sleep, alertness and hormone regulation. EPFL has joined forces with Geneva School of Art and Design (HEAD – Genève) to develop a wearable sensor that measures how much light an individual is exposed to along with the spectral resolution of that light. How much light do you receive over the course of a day? What type of light enters your eyes? Spectrace, a new piece of wearable tech, could soon provide the answers to these questions. In a groundbreaking move, researchers at EPFL's Laboratory of Integrated Performance in Design (LIPID) have teamed up with teachers and students from Geneva School of Art and Design (HEAD – Genève) to develop a light sensor concept.



[MIT Technology Review](#)
**A nanotube material conducts heat in
 just one direction**

10 December 2019

Asymmetric conductors could revolutionize cooling systems for computers and other devices.



[SpringerNature](#)
**Studies on the removal of copper ions
 from industrial effluent by Azadirachta
 indica powder**

03 December 2019

Abstract Rapid industrialization, urbanization and population growth have resulted in air, water and land pollution. Water pollution is a major concern across the globe. Discharge of huge amount of industrial wastewater adversely affects the human and environment. Heavy metal pollution is considered to be one of the serious environmental problems today. Due to strict environmental regulations in the country, it is required to bring down the pollution level to a permissible limit. The present study assessed the capability of Azadirachta indica (neem leaf) powder as a natural adsorbent in the removal of copper ions from aqueous solutions. The characterization of the adsorbent was performed using X-ray diffraction, scanning electron microscopy and Fourier-transform infrared spectroscopy.

Public Perception

Negative public perception poses risks for the chemical and materials sector

Improving the public's understanding of the industry continues to be a challenge for the chemical and materials sector. More favourable public perception is necessary if the industry is going to be able to successfully advance new technologies and products. Improved perception could help drive early development and technologies to commercialization, and nurture the systems needed to better foster innovation. Negative perception meanwhile threatens to dramatically delay or interrupt development, while potentially ill-informed regulation can create significant business risk that can quickly morph into broader economic and social risk. Consumers are demanding greater amounts of information about the manufacturing processes behind the products they buy, which has prompted a need for the sector to describe its processes using clearer and more accessible language. People also expect at least a certain degree of social and environmental responsibility, and both intentional and accidental transgressions by companies are now subject to greater scrutiny.

The power of social media is at anyone's fingertips, and mass media covering the industry can potentially be ill-informed. Published stories have in the past contributed to a slanted view of the sector and of its potential global benefit. The industry in general needs to make greater efforts to improve public communication about its contributions to sustainability, and about its historic contributions to many peoples' relatively high standards of living. Otherwise, it risks a pervasive lack of interest from young people headed towards careers in science and technology, a lack of skilled employees needed to move the sector forward, and most importantly, a lack of public trust and partnerships needed to help solve some of the world's greatest challenges.

Related insight areas: [Media and Entertainment](#), [Entrepreneurship, Education and Skills](#), [Corporate Governance](#), [Plastics and the Environment](#), [Workforce and Employment](#), [Future of Consumption](#), [Youth Perspectives](#)



GreenBiz

How companies can integrate a more sustainable materials strategy into their business

21 January 2020

Almost any textile you can think of, from cotton to leather to nylon, has social and environmental impacts risks at every level of its supply chain.



World Economic Forum

Our indispensable problem: the paradox of modern plastics

15 January 2020

Plastics pose a huge environmental challenge - but they also offer enormous environmental benefits, too. Here's how we can address the former without sacrificing the latter.



World Economic Forum

We can use plastics to change the world for the better

27 December 2019

Plastic is often seen as something to be eradicated entirely, but it has enormous potential as a resource that could open up new - and sustainable - markets and job opportunities.



VoxEU

How government spending on defence research benefits the private sector

18 December 2019

Defence R&D is a major component of government-sponsored R&D in many developed economies, and the effect of defence R&D expenditures on private sector innovation and economic growth has been a hotly debated topic for many years. This column presents a systematic analysis across all OECD countries which suggests that a 10% increase in defence R&D results in a 4% increase in private R&D. It also reveals evidence of spillovers between countries, with increases in government-funded R&D in one country appearing to increase private R&D spending in the same industry in other countries.



SpringerNature

Coffee processing wastewater treatment: a critical review on current treatment technologies with a proposed alternative

18 November 2019

Abstract Coffee is globally the second largest most traded commodity after petroleum, and this has facilitated many countries to grow and produce coffee in commercial quantity. The production processes uses large volume of water which comes out as contaminated water. The presence of toxic chemicals like tannins, phenolic and alkaloids inhibits biological degradation. Microbial processes break down the organic substances released into water bodies slowly, using up the oxygen from the water (COD). As demand for oxygen needed to break down organic waste in a wastewater begins to exceed supply, a decrease in oxygen needed to combine with chemicals (COD) slowly creates anaerobic condition.



World Economic Forum

We must bridge the gap between technology and policymaking. Our future depends on it

12 November 2019

As technology continues to permeate society, surviving the future depends on bringing technologists and policymakers together. Here's how we might achieve it.



Max Planck Society

"The metal industry is about to undergo one of the greatest upheavals in history".

10 November 2019

Dierk Raabe, Director at the Max Planck Institute for Iron Research in Düsseldorf, explains the opportunities that industrial companies already have today to achieve the goal of a sustainable metal industry. - Metallic materials are the backbone of modern economies. However, large quantities of CO₂ are produced during their production and processing. The metal industry must therefore use more climate-friendly processes in the future. The CO₂ balance of alloys and their components must also be improved over their entire service life. Dierk Raabe, Director at the Max-Planck-Institut für Eisenforschung in Düsseldorf, explains the possibilities that industrial companies already have in this respect as well as the tasks that metallurgists must take on in order to achieve the goal of a sustainable metal industry.

Chemical and Materials Sustainability

Chemical industry products could be used to help ensure a more sustainable future

The environmental sustainability of the chemical and materials industry is already a significant concern in many wealthy countries, and is increasingly a concern in Asia. In China, environmental standards are becoming more stringent, and emissions restrictions are helping to shut down thousands of operating sites every year. While curbing emissions and discharges is essential, the industry must also generally become able to utilize resources more responsibly and efficiently. The industry, after all, is a critical factor for countries that are trying to meet their obligations regarding mitigating and adapting to climate change. Companies have generally been using energy and materials more efficiently and making sustainability a part of their product innovation. The sector is also enabling other industries to follow through on their own sustainability commitments, in the form of solutions for energy-efficient buildings, sustainable transportation, and water purification, and in terms of exploring alternative feedstocks and biotechnology processes. In addition, the sector is developing more transparent and accurate ways to assess the sustainability of production. Demand for more credible and verifiable analysis tools will only increase.

The concept of the circular economy, where materials are reused and recycled rather than disposed of, is gaining significant political and industry momentum. The chemical and materials industry is best positioned to contribute to this through innovation that helps address mounting concern regarding plastics pollution, for example. Every year, millions of tons of plastic are disposed of, and a very small fraction is recycled. Related pollution may only get worse as plastics production further expands. Addressing the issue of plastics pollution requires global, coordinated action from both the public and private sectors. The chemical and materials industry should help define a new plastics economy, where materials do not end up in a landfill or in the oceans. In order to do this, the industry has to work hand-in-hand with governments in order to help devise policies that enable a truly circular economy of plastics, and mitigate environmental vulnerability.

Related insight areas: [Civic Participation](#), [Environment and Natural Resource Security](#), [Sustainable Development](#), [Agriculture, Food and Beverage](#), [Water](#), [Future of Consumption](#), [Batteries](#), [Climate Change](#), [Circular Economy](#), [Oceans](#), [Future of Energy](#)



Nature

The chemists policing Earth's atmosphere for rogue pollution

22 January 2020

These researchers tracked down mysterious sources of ozone-destroying chemicals in China and guard the planet against future illicit emissions.



Ulsan National Institute of Science and Technology (UNIST)

Stretchable and Colorless Freestanding Microwire Arrays for Transparent Solar Cells with Flexibility

20 January 2020

As solar cells become more transparent, you may now add transparent panels of solar cells on windows of buildings and electronic devices to generate electricity. Furthermore, in adding flexibility to this, its product range will be even expanded to assure the future mobile applications for wearable devices. A research team, led by Professor Kyoung Jin [...].



Frontiers

Air Quality Characterization at Three Industrial Areas in Southern Italy

14 January 2020

Outdoor air pollution is responsible for more than 4 million premature deaths worldwide and its contribution is particularly severe in industrial contaminated sites, where epidemiological studies highlight often mortality rate larger than the national average. In the framework of the CISAS project, this study investigates spatial and temporal variability of air pollution across three industrial contaminated sites in southern Italy classified as "High Risk Area of Environmental Crisis": Crotone, Milazzo, and Priolo.



Frontiers

Rare Earth Elements in Andaman Island Surface Seawater: Geochemical Tracers for the Monsoon?

09 January 2020

The Asian summer monsoon affects the lives of billions of people. With the aim of identifying geochemical tracers for the monsoon-related freshwater input from the major rivers draining into the Bay of Bengal (BoB) and the Andaman Sea (AnS), we have analyzed the yttrium and rare earth element (YREE) concentration of surface seawater samples from various locations spanning the Andaman Islands in 2011 to 2013. In some locations, samples have been taken in March, July, and November 2011, thus spanning the seasonal cycle and including different monsoon phases. Generally, the YREE patterns are similar to those reported for offshore samples from the BoB and AnS in January 1997, with seawater-normalized patterns of most samples characterized by middle REE enrichments.



World Economic Forum

How quantum computing could beat climate change

17 December 2019

A catalyst designed and tested through quantum computing that "scrubs" carbon dioxide from the atmosphere could be a powerful tool in tackling climate change.



Science Daily

Detours may make batteries better: Scientists show point defects in cathode crystals may speed lithium absorption

09 December 2019

Adding atom-scale defects to battery materials may help them charge faster, theoretical models show.



Project Syndicate

Why the Plastic Crisis Matters

06 November 2019

Photos of littered beaches and whales ingesting plastic bags have focused media and political attention on the problem of plastic waste. But the plastic crisis is not just about what ends up in the ocean; it is about whether we are capable of achieving a sustainable existence on this planet.

Chemical Restructuring

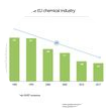
Divestments, mergers, and acquisitions are testing the chemical industry's identity

In a world where resource consumption is coming under increasing public scrutiny, companies in the chemical and materials sector have been pushed to find new ways to grow. The sustained pace of mergers and acquisitions activity between 2015 and 2018 was both an indication of structural changes afoot in the industry, and of the increased need for these transactions as sources of growth.

Consolidation, the expansion of product portfolios, and efforts to specialize are major M&A drivers, with the highest rates of activity observed among commodities, fertilizer, and agricultural chemicals businesses. M&A has been one means for growth in an environment of declining margins, product commoditization, and growing competition in emerging markets. However, it has proven to be insufficient to drive sustainable growth.

Social expectations, regulation, and new technologies are all affecting chemical and materials firms. The concept of the circular economy, where materials are re-used rather than disposed of, is increasingly gaining traction; the Circular Economy Package introduced in the European Union in 2018 is accelerating the recycling of waste plastics and the use of recycled plastic. Some plastic materials suppliers are keying on this trend by exploring models that incorporate recycling facilities into their operations (for example, Borealis' acquisition of Ecoplast Kunststoffrecycling in 2018). In parallel, many large oil and gas companies have invested in petrochemical capacity, and their "crude oil-to-chemicals" businesses are expected to have a significant impact. Several related projects are being constructed or planned in Saudi Arabia and Asia. Integration, alliances, and organic growth will still be important parts of the industry - though additional research and development capacity will be needed in order to guarantee economic sustainability, and to help chemical companies recover their status as innovation leaders. Profit opportunities may be found in R&D breakthroughs that help respond to challenges like poor air quality and energy efficiency, and to the need to reduce waste.

Related insight areas: [Innovation](#), [Circular Economy](#), [Oil and Gas](#), [Entrepreneurship](#), [Banking and Capital Markets](#), [Sustainable Development](#)



World Economic Forum
How to build a more climate-friendly chemical industry

21 January 2020

Cutting carbon emissions in the chemical sector will be hard - but the benefits could be enormous. Here's a look at where the industry is today - and where it could go tomorrow.



SpringerNature
Kinetic and isotherm modeling for acid blue 113 dye adsorption onto low-cost nutraceutical industrial fenugreek seed spent

18 January 2020

Abstract The present study reports about the use of fenugreek seed spent as a new and efficient biosorbent for the removal of acid blue 113 dye from aqueous media and textile industrial effluent. The spent is a low-cost by-product of nutraceutical industry. The effects of various process parameters of adsorption, such as pH, initial dye concentration, adsorbent dose, adsorbent particle size, contact time and temperature onto nutraceutical industrial fenugreek seed spent (NIFGS) have been studied. Four numbers of two-parameter and six numbers of three-parameter isotherm models were used in the analysis of adsorption equilibrium data. Kinetic studies data conformed to pseudo-second-order model. Molecular diffusion studies were carried out using Weber–Morris, Dumwald–Wagner and film diffusion models.



World Economic Forum
Here's how to rebut the climate doom-mongers

08 January 2020

It's that time of year when the apocalyptic climate predictions start rolling in. It's easy to be cynical about the progress being made - but here's why you shouldn't be too disheartened.



Brookings
The shifting energy landscape and the Gulf economies' diversification challenge

11 December 2019

Brookings Fellows Samantha Gross and Adel Abdel Ghafar outline the opportunities and constraints to economic diversification in the countries of the Gulf Cooperation Council in a new Brookings report.



SpringerOpen
Performance optimization of polymeric porous membrane-based liquid desiccant air dehumidifier used in air conditioning system

02 December 2019

Abstract In this study an experimental design was developed to optimize the performance and structure of a membrane-based parallel-plate liquid desiccant dehumidifier used in air conditioning regeneration system which operates under high humidity weather conditions. We conducted a series of polymeric porous membranes with different compositions fabricated that were prepared with various weight percentages of polysulfone (PSU), mixed with N -methyl-2-pyrrolidone (NMP) and dimethyl form amide (DMF) solvents. Furthermore, the designed experiments were performed under various operating conditions, indicating that the dehumidification efficiency declines with increasing flow rate, temperature, and humidity.



SpringerNature
Simultaneous removal of selenite and selenate from drinking water using mesoporous activated alumina

18 November 2019

Abstract The present study reports detailed evaluation of mesoporous activated alumina (MAA) for simultaneous removal of two hazardous inorganic species of selenium, namely selenite and selenate, from drinking water. MAA was used after washing with deionized water followed by drying at 110 °C for 8 h. The material was characterized using pXRD, FTIR, zeta potential, SEM and BET surface area measurements. Batch adsorption studies were performed, and various adsorption isotherms and kinetic parameters were computed to delineate the mechanism of adsorption. It was observed that Freundlich adsorption isotherm was the best-fit model for both the species of selenium. The adsorption capacity obtained from Freundlich isotherm for selenite and selenate was found to be 9.02 $\mu\text{g g}^{-1}$ and 5.38 $\mu\text{g g}^{-1}$, respectively.



Rocky Mountain Institute
We Are Living in a Materials World

05 November 2019

It's as true today as it was when Madonna first sang it more than three decades ago: we are living in a material(s) world. Besides cluttering our lives, the objects around us are produced via a multistage process called a... Read More The post We Are Living in a Materials World appeared first on Rocky Mountain Institute .

Chemical and Materials Talent

The industry has to revamp its workforce, and better attract fresh talent

The chemical and materials industry faces two serious challenges when it comes to its workforce: the first is a need to redefine and adapt in the context of the Fourth Industrial Revolution and its associated evolving technologies, and the second is related to attracting and retaining talent. The technological transformation of work is changing reality for millions of workers and companies, and the chemical and materials industry is no exception. Technologies like robotics and artificial intelligence are creating exciting opportunities in terms of productivity for businesses, and in the ways that they can replace unhealthy, dangerous, and repetitive tasks with high-skilled labour. In order to best take advantage of related opportunities and minimize risks, a redefinition of work is required across the industry, and proactive collaboration between governments and companies is necessary. Industry leaders generally see a shortage of the right skills as one of their most serious challenges when it comes to keeping up with innovation.

Most of these leaders therefore recognize a need to foster different skill sets in order to make their organizations more agile, and better equipped to embrace new technology developments as they arrive. For incumbent players in the industry to be able to fully exploit Fourth Industrial Revolution technologies to maximum benefit, there is an urgent need to invest in employees. Organizations are exploring mechanisms to develop and acquire the right skill sets, to enhance diversity, and to develop greater agility within their workforces - though these same organizations sometimes struggle to identify which key competencies they will need in the future. According to the results of a survey published by the American Chemistry Council and Accenture Talent Management in 2016, recruiting and retaining top talent was a major concern for the industry and a high priority for management; 87% of respondents highlighted the fact that the industry is suffering from a perception (or image) issue, which can make it unattractive to new graduates. Companies in the sector have to recognize the need to rethink their workforce models in ways that can better attract and retain the sort of employees who can help boost their performance in the future.

Related insight areas: [Agile Governance](#), [Workforce and Employment](#), [Education and Skills](#), [Innovation](#), [Fourth Industrial Revolution](#), [Leadership in the Fourth Industrial Revolution](#), [Youth Perspectives](#), [Future of Economic Progress](#)



LSE Business Review

Public investment in defence research can increase business innovation

17 January 2020

Government funding for innovation related to military uses represents a key channel through which governments all over the world shape innovation. In the US, for example, annual government defence-related research and development (R&D) expenditures were \$78 billion in 2016, over 57% of all government-funded R&D (Congressional Research Service, 2018).



Brookings

The macroeconomics of automation: Data, theory, and policy analysis

14 January 2020

Using machine learning techniques, the authors identify the types of individuals who have experienced job displacement due to advances in automation technology, and track their labor market outcomes. By studying the effects they are able to discuss potential policy solutions.



ETH Zürich

Biodegradable bridges

03 January 2020

Researchers are looking into new materials to lay the foundations for living structures that respond to their environment. They aim to create self-sustaining infrastructures that can monitor their condition and even repair themselves.



Project Syndicate

Economic Growth Is the Answer

12 December 2019

While rising inequality – a problem that the data suggest is real but overstated – has moved to the center of public debate, the key issue is that living standards are not improving fast enough among those who are falling behind. It is this fact that is fueling much of the political tension across advanced economies today.



Scientific American

Wild Silkworms Produce Proteins Primed for Bioprinting

28 November 2019

A mix of silkworms' proteins acts as a scaffold for 3-D-printed tissues and organs.



The New Humanitarian

Rohingya-run schools push for education amid tight restrictions

12 November 2019

Refugee teachers say they're filling a crucial gap. But they're doing it with little help from aid groups despite a shortage of qualified instructors in Bangladesh's camps.



World Economic Forum

Here's how a circular economy could change the world by 2030

29 October 2019

What might the world look like in 2030 if we have made the transition to a fully circular economy?.

The China Effect

Chinese chemical and materials firms are investing in innovation, and progressing

China is now the largest market for the chemical and materials industry, and the most important source of growth for chemical demand. By 2013, China accounted for one third of the global chemicals market, and that figure was expected to reach 40% by the year 2020. At that point, in terms of total value, China's chemicals market is expected to be worth roughly \$2 trillion (out of a total of roughly \$5 trillion in global market value). Despite the country's ongoing trade friction with the US and its broader economic deceleration, the near-term outlook for the chemicals industry in China appears to be solid - it is expected to remain both the world's largest and fastest-growing for the foreseeable future.

Not long after ChemChina's \$43 billion purchase of Swiss agrochemical giant Syngenta in 2017, marking China's biggest overseas takeover to that point, a number of countries began to more aggressively limit their openness to acquisitions by Chinese firms. Germany and other European Union countries have established mechanisms to review foreign investments, and in late 2018 Germany implemented rules that enable the government to intervene in the public interest if a non-European purchaser buys a stake in a domestic company of 10% or more. Meanwhile China's chemical and materials industry is delving into more specialized markets, and becoming more selective about growth. In addition, the tightening of environmental regulation (with the backing of the emerging urban middle class) is profoundly influencing the industry's strategic decisions. The localization of production, procurement, and especially research and development are likely to continue to create greater value and more locally-adapted products, while further boosting competitiveness.

Related insight areas: [Future of Economic Progress](#), [ASEAN](#), [International Trade and Investment](#), [Geo-economics](#), [Geopolitics](#), [China](#)



Science Daily

Edible 'security tag' to protect drugs from counterfeit

16 January 2020

Researchers are aiming to stump drug counterfeiters with an edible 'security tag' embedded into medicine. To imitate the drug, a counterfeiter would have to uncrack a complicated puzzle of patterns not fully visible to the naked eye.



World Economic Forum

Women lag behind men in the race for tomorrow's jobs. But one skill could close the gender gap

19 December 2019

The Global Gender Gap Report finds women aren't acquiring disruptive tech skills as quickly as men.



Imperial College London

Oil-catching sponge could soak up residue from offshore drilling

16 December 2019

An oil-catching sponge, developed at the University of Toronto and Imperial, could help thwart water contamination from offshore oil drilling.



Imperial College London

New membrane technology to boost water purification and energy storage

02 December 2019

Imperial College London scientists have created a new type of membrane that could improve water purification and battery energy storage efforts.



Australian Strategic Policy Institute

The China Defence Universities Tracker

22 November 2019

Exploring the military and security links of China's universities.

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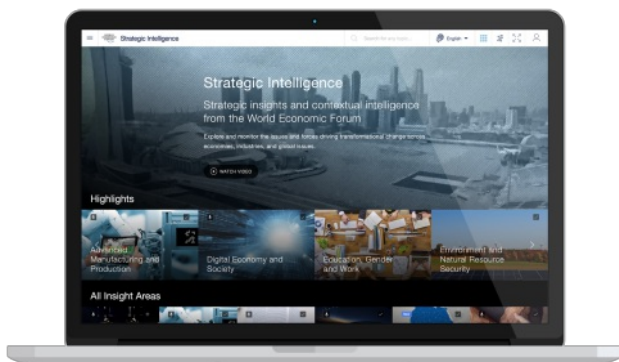
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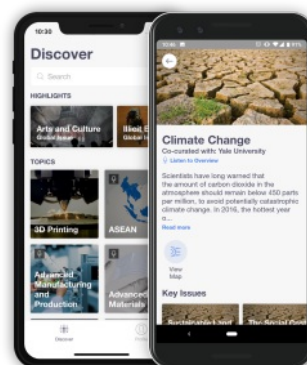
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