

## Upcoming Reports\*

State of the Market Report | Publication Date: January 2019

### **A Vertically Integrated Powerhouse: China's Strategy for Leading the Energy Storage Industry**

China's rapidly growing EV sales and concentration of battery production has impacted the world's emerging energy storage industry. This report analyzes China's focus on becoming vertically integrated leaders of the lithium-ion industry, their future activities in next-generation batteries, and implementing those batteries in automotive or stationary applications.

Energy Storage, Owning the Energy Transition

State of the Market Report | Publication Date: January 2019

### **Monitoring and Control for Water Quality**

Due to the size and complexity of water and wastewater systems and the premium instrument costs, the water industry has struggled to automate water quality monitoring. Meanwhile, increasing concerns over public health and irregularly but inexorably tightening regulations put utilities under pressure to ensure safe drinking water and wastewater discharge. Potential to improve plant performance and uptime also encourage more active adoption of advanced sensors among industrial operators. This report shows the interesting use cases for different water quality sensors across the water space.

Owning the Energy Transition, Water

State of the Market Report | Publication Date: January 2019

### **Building a Circular Economy**

The Circular Economy - converting waste such as spent biomass, foodwaste, and plastic waste into products with value - has seen significant innovation interest in recent times. However, the path towards circularity requires connecting multiple technologies including waste collection/sorting, and the conversion technologies themselves. This report aims to highlight and evaluate these enabling technologies, while also highlighting gaps in creating a circular economy.

Accelerating Materials Innovation

State of the Market Report | Publication Date: January 2019

### **Carbon Nanomaterials Update**

This report will update our Carbon Nanomaterial coverage. To complement last year's production-focused report, this report will focus more on applications. It will feature a detailed study of use cases and applications, case studies of industry players, a data driven analysis of applications, and updated Lux Innovation Grids.

Accelerating Materials Innovation, Advanced Materials

State of the Market Report | Publication Date: January 2019

## Food, health, and wellness in retrospect: The top news, tech, and questions you asked in 2018

Over 2018, we saw major changes across the food and health value chain, from the introduction of new crops developed with gene editing to progress on growing meat without needing animals. It was an eventful year, which can make it difficult to keep perspective on the major changes, and avoid getting caught up in day-to-day happenings. This report offers a retrospective view of 2018 - the news we covered and what it means for your business, the top developers our analysts feel are worth engaging with, and the major questions that you and your competitors asked our analyst team. It also helps frame the themes we anticipate covering in 2019 and beyond

Consumer Choices in Food, Health, and Wellness

State of the Market Report | Publication Date: January 2019

## Energy's Top News, Technology Developers, and Questions You Asked About in 2018

Highlights of the top news, technology developers, and questions that you and your peers asked Lux Research about in 2018. While not designed as a ranking list, this report instead serves as a summary of the developments in 2018 and how Lux Research's Energy Team views them as key steps in the evolution of the energy system in 2019 and beyond.

Owning the Energy Transition

State of the Market Report | Publication Date: February 2019

## The Cost-Effective Distributed Grid: Energy Trading Within Microgrids

While the energy transition promises a decentralized electrical grid composed of a network of actors with distributed energy resources, microgrids are not cost-effective for many electricity customers around the world. However, recent years have seen a rise of energy trading software platforms, which promise to provide better compensation for distributed generation and energy assets. We examine the combination of energy trading and microgrid technology to determine if we have finally crossed that critical financial turning point - whether it is more cost-effective to source electricity from distributed resources than from the electrical grid.

Owning the Energy Transition

State of the Market Report | Publication Date: February 2019

## Measuring the Impact and Opportunity of 5G in Physical Industries

This report will take a deeper look at 5G technology and its potential impact on physical industries like manufacturing, automotive, oil and gas, energy, and agriculture. It will cover both operational impacts on these industries, as well as potential business opportunities for developers.

Digital Transformation, Industrial Internet of Things

State of the Market Report | Publication Date: February 2019

## Roadmap: Next Generation PV

Silicon remains the dominant material in the PV market, with innovations coming mostly from the larger players. In order to keep ahead of the competition, companies are continually improving on silicon PV architectures. This report is an update on the advanced silicon PV report of 2015, noting new trends in research and manufacturing in silicon PV, and highlighting the economics and scenarios of deployment of each type.

Next Generation Power, Owning the Energy Transition

State of the Market Report | Publication Date: February 2019

## The State of Your Innovation in 2019

What keeps innovation executives up at night? Tapping into our proprietary data around the world's innovation executive peer group, we analyzed more than 100,000 recent technology-related searches run on our platform, 10,000 questions asked of our analysts, and 1,000 key innovation initiatives of leading companies (all aggregated and anonymized, of course). The results paint an accurate and insightful look into the state of the world's actual innovation trends going into 2019: What technologies are attracting the most interest, what strategic questions are proving hard to answer, what start-ups are attracting the most attention, and more.

Accelerating Materials Innovation, Consumer Choices in Food, Health, and Wellness, Digital Transformation, Owning the Energy Transition

State of the Market Report | Publication Date: February 2019

## Connected Car: How Connectivity Will Enable Digital Services in The Vehicle

The connected car technology space is broad and complex. Because of this complexity, identifying opportunities can be challenging. This report will look at connectivity and how it will enable digital services in the car.

Autonomous Systems 2.0, Consumer Choices in Food, Health, and Wellness, Consumer IoT, Digital Transformation

State of the Market Report | Publication Date: February 2019

## Artificial Intelligence: Challenges and Emerging Solutions

The rise of AI has left a wake of misinformation, confusion, and overpromises. This report, a follow-on to the first report we published two years back, will look to sort through the hype, establish clear definitions for terms such as AI, categorize different available techniques, and highlight emerging technologies along with the challenges of implementing AI solutions.

Digital Transformation, Industrial Big Data and Analytics

State of the Market Report | Publication Date: February 2019

## Identification of a pathway towards differentiation and success with biofertilizers

Biofertilizers remain poorly defined, with products like organic material, biostimulants, and compost often incorrectly included in the technology landscape. Unfortunately, this improper labeling serves only to further mystify the space along with potential opportunities. In this report Lux explicitly defines biofertilizers, identifies differentiation among developers and their products, and provides a pathway towards success in this rapidly developing space.

Agro Innovation, Consumer Choices in Food, Health, and Wellness

State of the Market Report | Publication Date: February 2019

## Digital Sales Platforms

This report will use the digital business model framework to understand the impact of digital tools and technologies on the sales process in the materials and chemicals space. It will cover a landscape of current activities, parse the benefits of digital transformation in chemical sales, and highlight future directions for development and integration.

Accelerating Materials Innovation, Digital Transformation

State of the Market Report | Publication Date: February 2019

## Corporate Tech Innovation is a Solved Problem: What You Need to Know to Be a Leader

This report will discuss the most important corporate innovation tools, highlighting some neglected tools, and the keys to successful implementation.

Accelerating Materials Innovation, Corporate Strategic Intelligence: Chemicals and Materials

State of the Market Report | Publication Date: February 2019

## State of Innovation in Asia-Pacific

As the dynamics of the global innovation ecosystem continues to shift with the rise of China, interest in Asia-Pacific has never been greater. While historical powerhouses, such as Japan and Korea, continue to innovate at their reputable rates, China's national initiatives as well as the flow of their capital into the surrounding areas - Southeast Asia and India - will likely spur the rise of new innovation ecosystems. In this report we take a look at the key hotspots for innovation, identifying the major players in the powerhouses, as well as finding hidden gems in the less thought about countries.

Accelerating Materials Innovation, Consumer Choices in Food, Health, and Wellness, Digital Transformation, Owning the Energy Transition

State of the Market Report | Publication Date: February 2019

## Asia's Future City

Asia's rising urbanization presents numerous opportunities for bleeding edge technology deployment. However, at the same time, lack of traditional infrastructure and a variety of problems from traffic congestion and pollution, will only be amplified as droves of people migrate into cities. While most nations plan to address the immediate needs, several have futuristic aspirations for developing digital societies in a future city. In this report, we analyze the key technologies that will address the demands of Asia's future city as well as highlight the key innovators developing them domestically.

Digital Transformation, Owning the Energy Transition

State of the Market Report | Publication Date: February 2019

## Quantum Sensors

Quantum sensors offer improvements in sensitivity and precision compared to their classical sensing counterparts. In this report, we will discuss the current capabilities and development opportunities in materials and designs.

Digital Transformation, Sensors

State of the Market Report | Publication Date: February 2019

## Biofuels Outlook

Today's biofuel industry is a long way from its rapid ascension of the early and mid-2000s. Growth in capacity for first-generation (1G) biofuels has stalled, but advanced biofuels are gaining ground. To characterize this new era of the global biofuels industry, we built a comprehensive database of nearly 2,000 facilities which we use to forecast the growth of the industry and examine trends in new nameplate capacity, location, fuel, feedstock, and conversion technologies.

Alternative Fuels, Owning the Energy Transition

State of the Market Report | Publication Date: February 2019

## Top Materials Developments in 2018 and What to Look for in 2019

To guide clients for the year ahead, in this annual Lux report we review key tech activity from 2018 and identify key tech trends for 2019. We do this by combining analyst input with data from the Lux Intelligence Engine. Themes include a focus on using new digital technologies to enhance customer experience, the difficulty of turning materials inventions into products, and transforming consumer needs (including the desire for sustainability).

Accelerating Materials Innovation

State of the Market Report | Publication Date: March 2019

## Water Infrastructure in the Developing World

The main opportunity for innovation in water infrastructure exists in developing countries, because they are not hampered by difficult-to-replace legacy infrastructure. This report looks into the developments and describes what technologies are actually being deployed, and why.

Owning the Energy Transition, Water

State of the Market Report | Publication Date: March 2019

## Electric, Autonomous, and Shared: Business Models Defining the Future of Mobility

Electrification and automation continue to shape the future of the automotive industry, capturing not only headlines but significant investments toward their development from vehicle manufacturers and their suppliers. At the same time, new business models focused on shared and connected forms of mobility are emerging to capitalize on these new technologies, threatening to shift a consumer's perception of a product to a service. This report envisions a transportation system defined by the intersection of electrification, autonomy, and shared mobility to identify pain points and opportunities in the future of mobility.

Digital Transformation, Owning the Energy Transition

State of the Market Report | Publication Date: March 2019

## Energy Management in the Smart Home

The smart home ecosystem includes different types of solutions and technologies with a number of purposes, such as enabling energy savings, increasing comfort and convenience, and ensuring safety and security in the home. This report intends to focus on the role of home energy management within the smart home ecosystem. The goal is to highlight available technologies and their current applications in the smart home and identify gaps, key challenges, and areas of opportunity.

Future Grid, Owning the Energy Transition

State of the Market Report | Publication Date: March 2019

## Innovating innovation using digital technologies

While data collection and analysis offers the ability to transform all parts of the value chain in manufacturing, applying this to innovate new products represents a unique opportunity. It is not capex-intensive, not that disruptive to ongoing operations, and can significantly decrease time and cost involved in product development in the manufacturing sector. This report will identify how clients in the manufacturing sector can enhance their innovation efforts through the use of advanced data analytics and other digital technologies. We will also explore how digitalization of innovation will impact the underlying core innovation processes itself.

Digital Transformation

State of the Market Report | Publication Date: March 2019

## The decommissioning dilemma: the **Â£39 billion market opportunity in the North Sea**

With close to 2,500 wells scheduled to be plugged and abandoned in the North Sea by 2025, decommissioning offshore oil rigs will become increasingly important in the coming years. This report aims to evaluate innovation opportunities as the industry looks for ways to minimize costs and environmental impacts.

Exploration and Production, Owning the Energy Transition

State of the Market Report | Publication Date: March 2019

## Digitizing the fight against diabetes: From therapy to prevention

In this report we approach the digital management of diabetes by looking at the complete health spectrum from healthy to severely diseased individuals and highlight unmet needs and opportunities that digital health developers should take advantage of. We also highlight how these strategies should consider underlying differences, from molecular to cultural, when addressing different markets and regions.

Consumer Choices in Food, Health, and Wellness, Digital Health and Wellness, Digital Transformation

State of the Market Report | Publication Date: March 2019

## The Market Size for Smart Home

The growth of connected smart home appliances have expanded from lighting controls to thermostats, door locks, and even coffee makers. With the large influx of new products, how is the smart home market segmented, and where do opportunities lie?

Consumer Choices in Food, Health, and Wellness, Consumer IoT, Digital Transformation

State of the Market Report | Publication Date: March 2019

## Ubiquitous Sensing

As commoditized sensors become cheaper and offer improved performance they can now be more readily incorporated into new applications and devices that were previously not feasible. These always-on sensors in consumer and industrial environments will allow for continuous monitoring, all while being transparent and not interfering with individuals daily activities.

Digital Transformation, Sensors

State of the Market Report | Publication Date: March 2019

## Harnessing the potential of digital technologies for the food industry

Digital technologies are creating a major impact on every industry. In this report, we will assess the potential of emerging digital technologies for various applications within the food value chain. It will also highlight opportunities for the industry players to harness the digital toolbox and discuss key winning aspects of successful use cases in the food industry.

Consumer Choices in Food, Health, and Wellness, Digital Transformation, Food and Nutrition

State of the Market Report | Publication Date: March 2019

## Regional BBMC Trends

This report will explore bio-based materials and chemicals (BBMC) trends globally and analyze how regulations are impacting technology development and adoption.

Accelerating Materials Innovation, Bio-based Materials and Chemicals

State of the Market Report | Publication Date: March 2019

## Finding the Next Disruptive Materials Innovations

Advances in basic science are always occurring, and new breakthroughs could be around the corner. This report seeks to identify stage zero materials technologies that could be highly impactful and build a timeline for their possible development.

Accelerating Materials Innovation, Advanced Materials

State of the Market Report | Publication Date: March 2019

## How to Form a Materials Informatics Strategy

Materials informatics applies data science and AI methods to better understand the use, selection, development, and discovery of materials. As an emerging technology with strong momentum during the past year, it is used across the value chain, from upstream materials and chemicals developers to downstream product manufacturers. In this report, we provide a comprehensive understanding of the key players and their activities in this space. Specifically, we will review different application areas, data challenges, and recent developments from both startups and large corporations. We also provide our vision on the near future of how materials informatics will expand from materials to parts and products, from working with a few R&D units to establishing a whole platform for each part of the value chain. Finally, we discuss why clients across the value chain should overcome the data-sharing fear to work on materials informatics. We also propose three strategies to engage with materials informatics and advise on how to form a strategy that works the best.

Accelerating Materials Innovation, Digital Transformation, Materials Design and Manufacturing

State of the Market Report | Publication Date: April 2019

## Genomics in agriculture

Big data in agriculture was initially synonymous with "precision agriculture," however the rise of genomics and other informatics tools are fundamentally changing the roles DNA and data play in agriculture. (This report will be the first of a "Genomics in X" series, building on the "Power of DNA" report/webinar)

Agro Innovation, Consumer Choices in Food, Health, and Wellness, Digital Transformation, Industrial Big Data and Analytics

State of the Market Report | Publication Date: April 2019

## Electronic Materials

Materials innovation is driving the next wave of electronic devices, from flexible displays to ubiquitous sensors. We will survey the electronic materials innovation landscape to understand what materials will enable these devices, and when the materials will be ready for market.

Accelerating Materials Innovation, Digital Transformation

State of the Market Report | Publication Date: Q2 2019

## Food Value Chain CVC Comparison

Food companies have become more serious about their commitments to supporting start-up innovation efforts through the formation of numerous corporate VC groups - and their investments have been widely varied in scope. This report will assess the landscape of those funds, demonstrating the winning approaches.

Consumer Choices in Food, Health, and Wellness

State of the Market Report | Publication Date: Q2 2019

## Pinching the Funnel: How China's Public, Private, People Approach to Innovation Makes it a Global Force

In recent years China is continuously challenging the West for the top spot on the global innovation leader board. With a face-paced innovation process that is counter intuitive to the traditional stage-gate approach developed and deployed in the West, China is quickly transforming itself into a global innovation leader - shedding its dated copycat stereotype and quickly transforming into the copied. At the root of this success is the fast changing socio-economic trends coupled with access to cutting edge technologies. In a unique public-private-people partnership, the government, private sector, and the masses together are enabling the country in bringing new innovations into the market at lightning speed.

Accelerating Materials Innovation, Consumer Choices in Food, Health, and Wellness, Digital Transformation, Owning the Energy Transition

State of the Market Report | Publication Date: Q2 2019

## Organizing for Digital

Many companies are trying to embark on their digital transformation. However, success rates are not that high; estimates indicate that more than 80% of digital transformation projects fail. While there are many determining factors for success, one of them is the structure of the organization and the culture within an organization. Interestingly, with the arrival of digital, companies also need to re-imagine their traditional structures. How can companies organize themselves to ensure success in their digital transformation efforts? What type of a culture should they build? With the arrival of digital, what should the org structure look like to ensure success in the future?

Digital Transformation

State of the Market Report | Publication Date: Q2 2019

## Decarbonizing the Industrial Sector

The industrial sector is responsible for 21% of global CO2 emissions and will be the hardest to decarbonize due to its intrinsic need for carbon feedstock and high thermal requirements needs for process operations. However, the industry is coming under increasing pressure to innovate and adopt low-carbon solutions. In this report, we will examine the various technology options available for the industry to decarbonize its operations, and assess the opportunities and challenges that present exist for each technology option.

Owning the Energy Transition



State of the Market Report | Publication Date: Q2 2019

## Industrial Power Symbiosis: Finding Cost-Effective Cases for On-Site Power Generation

When and how will industrial customers of electricity find it most cost-effective to source their own electricity from on-site generators? This report will match power generation technologies with the industries that can benefit from their use and secondary benefits, such as heat and hydrogen production.

Future Grid, Owning the Energy Transition

State of the Market Report | Publication Date: Q2 2019

## The Market Opportunity for Flexible Displays

Flexible displays have been an emerging opportunity for over a decade, but have yet to achieve significant traction. In this report, we'll explore the state of the flexible displays market, how the technology's challenges can be overcome to enable widespread adoption, and how clients should participate in the flexible displays value chain.

Accelerating Materials Innovation, Digital Transformation, Electronic User Interfaces

State of the Market Report | Publication Date: Q2 2019

## Artificial Intelligence in China

This report will provide a deep understanding of AI activities in China and how these activities are poised to impact the world. We will analyze investment activity and government support in this space, evaluate the most important AI technologies and applications being targeted in China, and highlight how Chinese AI companies are gaining traction in the global marketplace.

Digital Transformation, Industrial Big Data and Analytics

State of the Market Report | Publication Date: Q2 2019

## Crude to chemicals: Bridging the gap between crude refining and petrochemicals

The interest in crude-to-chemicals has rapidly grown in recent years with multiple integrated oil companies moving further into the downstream value chain. This report offers a landscape for the process, answering three questions: The various technologies C2C comprises of, the chemicals that can be produced, and the economics associated with the process.

Owning the Energy Transition

State of the Market Report | Publication Date: Q2 2019

## Where and how to find the Green in Green technology

Lux covers the potential for sustainability and green technologies to become an alternate source of revenue as concerns regarding environmental impact and risk continue to grow.

Agro Innovation, Consumer Choices in Food, Health, and Wellness

State of the Market Report | Publication Date: Q2 2019

## Made in China 2025: Identifying China's Move up the Global Value Chain

Made in China 2025 is the most important government policy set to transform China into a global innovation leader in the next five years. In this report, we analyze the ten key industry sectors highlighted in this policy by identifying the specific technologies that China will be developing domestically, the funding that will support it, and the key companies where the core competencies of these technologies are embedded.

Accelerating Materials Innovation, Consumer Choices in Food, Health, and Wellness, Digital Transformation, Owning the Energy Transition

State of the Market Report | Publication Date: Q2 2019

## Energy Storage Market Size: 2019 Edition

This report will quantify the growing market for energy storage, developing market forecasts to project the adoption of energy storage across transportation, consumer electronics, and stationary sectors.

Energy Storage, Owning the Energy Transition

State of the Market Report | Publication Date: Q2 2019

## Decarbonizing the Industrial Sector: Power-to-Chemicals

In our recently-published "Decarbonizing the Industrial Sector" report, we introduced electrochemical conversion as a key technology that will allow the chemical industry to decarbonize its operations by replacing fossil-based feedstock with low-carbon alternatives produced from renewable electricity. In this report, we will look at the cost of electrifying key industrial processes, including but not limited to methanol production and ammonia synthesis, as well as the regulatory framework support needed to support the adoption of electrochemical technologies in the industrial sector.

Accelerating Materials Innovation, Owning the Energy Transition

State of the Market Report | Publication Date: Q2 2019

## Synbio Partnership Landscape

This report will map the synthetic biology partnership landscape to identify where current opportunities exist for partnering.

Accelerating Materials Innovation, Bio-based Materials and Chemicals, Consumer Choices in Food, Health, and Wellness

State of the Market Report | Publication Date: Q2 2019

## Understanding the Market Opportunity for Metamaterials

In the past four years, understanding of metamaterials has dramatically improved, and novel manufacturing techniques have become more mature. With the demand from communication and other sectors, metamaterials are on the cusp of commercialization. This report will identify key innovations and obstacles, and begin to quantify the market opportunity around metamaterials.

Accelerating Materials Innovation, Advanced Materials

State of the Market Report | Publication Date: Q2 2019

## Partnership Opportunities in Polymer 3D Printing

The polymer 3D printing space is becoming more fragmented with hundreds of start-ups, various materials, material form factors, and involvement of large corporations and service bureaus. What is the nature of the polymer 3D printing value chain? How is the partnership network evolving? And, what are the partnerships opportunities in the polymer 3D printing value chain?

Accelerating Materials Innovation, Digital Transformation, Materials Design and Manufacturing

State of the Market Report | Publication Date: Q2 2019

## The Dawn of Digital Product Optimization

Recent years have witnessed the developments of software technologies across the materials, part, product value chain. Materials informatics for material discovery and development; generative design, virtual reality (VR), and 3D printing simulation for part design and simulation; and predictive maintenance software for life cycle management, just to name a few. While each of these technologies progresses, there is still not a Digital Product Optimization (DPO) framework. Closely tracking these areas, Lux has already seen the possibility of some of these technologies integrating together. In this report, we will analyze the possibility of such a DPO. Specifically, we will talk examine what a DPO looks like and what it means for clients in industries across the manufacturing value chain.

Accelerating Materials Innovation

State of the Market Report | Publication Date: Q2 2019

## The 2019 Lux Competitive Benchmark for Large Chemical and Material Companies: Assessing Corporate Innovation Effort and Business Performance

This reports updates Lux's popular Lux Competitive Benchmark (LCB) report on large chemical and material companies first published last year. Although centuries old and largely mature technically and organizationally, the chemical industry still requires innovation to drive growth in a tough globally competitive market. To assess who is positioned to succeed, we analyze 40 top chemical and material firms using the LCB (which scores companies based on Innovation Effort and Business Execution) and other analysis tools. We examine the relationships between Innovation Effort and Business Execution, open and internal innovation, and tech research type across the whole industry and for specific industry segments.

Accelerating Materials Innovation

State of the Market Report | Publication Date: Q2 2019

## Ellen MacArthur Foundation #1 year later

This report will analyze the Ellen MacArthur Foundation. Specifically, it will focus on the first 11 to 12 companies that joined and their sustainability strategies (what are they, how likely is it that they're met).

Accelerating Materials Innovation

State of the Market Report | Publication Date: Q3 2019

## Southeast Asia's Energy Startup Ecosystem

Under a drastically different economic and technology backdrop, Southeast Asia's energy startup ecosystem has spawned with accessibility, affordability, and reliability as the top priorities in energy. This report will take a look at the region's energy startup ecosystem and identify the key players leading the cause and the unique sets of challenges they face. As the future global center of energy demand, it remains critical to understand the region to find key opportunities to enter the market with a higher success rate.

Owning the Energy Transition

State of the Market Report | Publication Date: Q3 2019

## Bio-based Intermediate Chemicals Market Growth

This report will assess growth projections of intermediate chemicals given different oil-price environments.

Accelerating Materials Innovation, Bio-based Materials and Chemicals

State of the Market Report | Publication Date: Q3 2019

## Plastic Recycling Technologies Cost Assessment

This report will model the cost of various plastic recycling technologies in order to assess and compare their respective value propositions.

Accelerating Materials Innovation, Alternative Fuels, Bio-based Materials and Chemicals, Owning the Energy Transition

State of the Market Report | Publication Date: Q3 2019

## The Status of Non-metal and Non-polymer 3D Printing

This report aims to define the 3D printing technology landscape for non-metal and non-polymer materials. It answers the following questions: Who are the key players developing other materials in the 3D printing space? What are their technological readiness levels? What does the technology development roadmap look like?

Accelerating Materials Innovation, Digital Transformation, Materials Design and Manufacturing

State of the Market Report | Publication Date: Q4 2019

## How 3D Printing Software Will Accelerate the Development of 3D Printing

In the last few years, synergies between the design software space and 3D printing have become increasingly apparent. For example, generative design software takes advantage of 3D printing's ability to expand manufacturability and vastly enlarges the explorable design candidate space. 3D printing simulation software models the stress profile of a part, and therefore predicts part failure before physically printing it. Within the 3D printing community, we are seeing a trend of 3D printing companies developing and strengthening their software components. Several major examples include Desktop Metal's software for generative design, Markforged's cloud-based software for part print optimization, and Arevo's computer-aided design (CAD) and FEA-based software for 3D printing design and simulation. In this report, we review the most relevant 3D printing software technologies and argue that the formation of a 3D printing software thread (design, simulation, manufacturing, as well as workflow management and data security) with data control through the whole process will be crucial for 3D printing at industrial scale. We expect to see more 3D printing companies either develop their own software strategies or to partner with large software companies in the near future.

Accelerating Materials Innovation, Digital Transformation, Materials Design and Manufacturing

State of the Market Report | Publication Date: Q4 2019

## Decarbonizing the Industrial Sector: Carbon Capture

In our recently-published "Decarbonizing the Industrial Sector" report, we introduced carbon capture as a key technology that will allow multiple industrial sectors to decarbonize their operations by capturing CO<sub>2</sub> emissions from point-sources. In this report, we will look at the cost of carbon capture using multiple configurations, as well as the regulatory framework support needed to support the adoption of carbon capture in the industrial sector.

Owning the Energy Transition

State of the Market Report | Publication Date: Q4 2019

## Connecting the Dots: The Impact of Industrial and Power Decarbonization on Gas Demand

Natural gas is often touted as the fuel that will power the ongoing energy transition. Several energy companies such as Shell, Total, and Qatar Petroleum have committed to expand their gas and LNG businesses, with the latter even quitting OPEC in its pursuit for gas. However, as industrial demand sectors such as power, steel manufacturing, paper, residential heating, gradually move towards disruptive, low carbon solutions such as hydrogen, heat pumps, and electric heating, the outlook for gas needs to be revisited. In this report, we connect the dots between the various pieces of the broader energy system, and analyse the collateral impact of emerging technologies on the global gas and LNG markets in the near future.

Owning the Energy Transition

State of the Market Report | Publication Date: Q4 2019

## Electronic Materials: The Emerging Solutions

Demand for 5G electronics and the emergence of the internet of things have created new demand for materials that offer higher performance but are cheap enough to enable rollout of millions of new devices. This report will identify new materials technologies in polymers for electronics and thermal management, as well as the technology developers behind these efforts, and pick winners for commercialization.

Accelerating Materials Innovation, Digital Transformation

State of the Market Report | Publication Date: Q4 2019

## Scouting Innovations for Corrosion's Tough Problems

Corrosion remains perhaps the most persistent challenge we face in the materials industry. New sustainability regulations are making this even more challenging, by pushing out chrome 6 and limiting the use of solvents. This report will scout early stage technologies, start-ups, and identify corporate approaches to tackling the corrosion challenge.

Accelerating Materials Innovation, Advanced Materials

State of the Market Report | Publication Date: Q4 2019

## Emerging Materials Opportunities for the Apparel Industry

The apparel industry is a huge market for polymers, coatings, dyes, and more, but the low cost tolerance and fast development cycles make materials innovation a challenge. However, there are increasing demands for sustainable products, differentiation, more functional clothing, and cleaner manufacturing. All this creates new opportunities for materials innovation; this report will highlight the most promising areas.

Accelerating Materials Innovation

State of the Market Report | Publication Date: Q4 2019

## The Modern-day Biotech Business Model

This report will examine the theoretical advantages of industrial fermentation (scale independent, allowing for right-sized and distributed manufacturing; flexible production) and reasons for 2018 setbacks. It will examine the continued shift towards high margin products.

Accelerating Materials Innovation, Bio-based Materials and Chemicals

State of the Market Report | Publication Date: Q4 2019

## Metal 3D printing Segmentation for Emerging Applications

This report will analyze the technical capabilities of existing metal 3D printers to: 1) define common use cases; 2) highlight further development areas; and 3) emphasize the caveats of metal 3D printing applications.

Accelerating Materials Innovation, Digital Transformation, Materials Design and Manufacturing