

Press Information

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Bio-performance Materials

- DSM has established an early leadership position in the emerging market for bio-performance materials.
- Strong product development, marketing and customer orientation will help capitalise on high expected growth rates in this sector in coming years.
- DSM is committed to using its expertise in the fields of Life Sciences and Materials Sciences to making bio-performance materials and solutions which have a low eco footprint and are respectful of biodiversity and other human and environmental factors.

Introduction

The modern global economy is built on fossil fuels. Our homes, cars, televisions, packaged foods, hospitals; virtually every product manufactured and operated, and every human activity, contain and use fossil fuels.

But the world faces a series of challenges including climate change, resource scarcity, population growth and increased consumption. These challenges fundamentally undermine the long-term viability of our fossil fuel-based world and are driving the development of the bio-based economy.

Reducing, reusing and recycling the products we consume will play an important role, but we must go further still, by helping the world transition itself from a fossil fuel-dependent economy to a sustainable, bio-based one. At DSM, we are passionate about playing a leading role in this transition.

We have been using our unique expertise in the fields of Life Sciences and Materials Sciences to innovate new materials made from bio-renewable sources that possess higher performance characteristics while also addressing the important issues of biodiversity and impact on the food chain that the bio-based economy raises. By working with our government, business and other stakeholders, we are helping create the standards and financial and regulatory conditions that are needed to help markets for these new materials establish and flourish.

While at a very early stage of development, the emerging market for bio-performance materials is set to grow rapidly in the coming years. DSM, as a pathfinder, is well-placed to capitalise on this growth and to maintain its early leadership position over the medium and long term.

What are bio-performance materials?

Bio-performance materials are materials that have either partial or 100% renewable content that are manufactured using either a biological or chemical process. They must offer greater overall value in terms of quality, performance, functionality and assurance of supply and have a smaller ecological footprint, than alternative conventional materials.

Bio-performance materials are suitable for all applications, from consumer electronics parts to racing car fenders. In fact, it has been estimated that bio-performance materials could eventually be used to replace virtually all products currently made from petroleum if price and scale were not an issue.

Some bio-performance materials have already been commercialised and further innovation is likely to lead to newer generation materials that comprise up to 100% bio-renewable sources, further exceeding performance and functionality expectations and reducing ecological footprints. Such innovations, helped by higher prices for traditional, petroleum-based materials, has been forecast to lead to double-digit growth rates per annum for bio-performance materials over the coming 5-10 years.

DSM and bio-performance materials

With a growing portfolio of products suitable for a range of industrial applications and sectors, including brands such as EcoPaXX™, Palapreg ECO® and Arnitel® Eco, DSM has established an early leadership position in the emerging market for bio performance materials. These materials are part of DSM's ECO+ portfolio¹, which means they add more value than mainstream products or processes while having a smaller environmental footprint.

This leadership position is based on the company's unique skill set at the cross-roads of materials and life sciences, its in-depth knowledge of a wide variety of end user markets and engagement along the entire value chain. Together, these elements create high barriers to entry to our rivals, and with a strong pipeline of innovative specialty products, DSM is well placed to identify, develop and capitalize on further future opportunities within this market.

In practical terms, this means engineering products and processes using both bio-based and fossil-based feedstocks that have the lowest eco footprint possible, the highest possible performance, the widest range of applications and the lowest possible price. This will require ongoing innovation, including exploring alternative production routes, be they biotech, chemical, or a combination of both, for our customers.

Bio-performance materials: the challenges

As with all innovation, bio-performance materials need to overcome a number of challenges before their market potential can be fully realised. These include conventional barriers to growth such as price-to-value, performance, security of supply and global logistics, but also challenges unique to bio-based products and solutions such as competition with the food chain, land use and biodiversity. Buyers want to see both the conventional barriers and the specific bio-based challenges addressed before making procurement decisions.

At DSM, we recognize that strong ecological credentials alone are not enough to succeed in the bio-performance materials market and that increased bio-based content has to be combined with greater overall value if the market is to gain real traction.

We also recognize that further work must be done with our customers, suppliers and other valued stakeholders to determine the true nature and benefits of bio-performance materials. Attention areas, priorities and the approach around sustainable procurement may vary considerably between various value chains like automotive, electrics& electronics, marine and packaging but in essence the challenge is the same: without a clear, industry-wide definition and set of metrics for bio-performance materials, customers will find it hard to make fully informed purchasing decisions.

This means DSM must play a leading role working with fellow stakeholders in industry and government in helping come up with a comprehensive, credible and international system for measuring the sustainability impact of bio performance materials. The Life Cycle Assessments DSM carries out, are one element of this system. LCAs can be used to compare the eco-performances of different products in the same application. DSM strives to carry out LCAs for all of its products. We provide the outcome of our LCAs to our customers, who can use it as input for LCAs on their own products. In this way we contribute to the eco-transparency of the overall value chain.

Our commitment to be a leader in regulatory and government relations as well as an advocate for the bio-based economy will require us to match the commitment we have already demonstrated in innovation and marketing.

Sustainability

Biodiversity, water-use, competition with the food chain and (indirect) land use are concerns in relation to the development of the bio-based economy more generally. DSM recognizes that biomass is a precious and scarce resource and its societal use must be balanced with the need to preserve biodiversity and the food chain.

In considering the concerns around the food chain, it's important to recognize that the use of biomass for the manufacture of materials is still at an early stage of development. DSM believes that bio-performance materials must offer greater value than conventional alternatives and that they must also have a lower greenhouse gas footprint and use feedstocks that do not compete with the food chain and respect biodiversity. We acknowledge that this may not always be possible with first generation technology but we are working hard, along with other companies, to make this goal commercially feasible.

The future of bio-based production lies in the use of waste produce from agriculture - produce that cannot be used to feed humans or animals - and feedstocks that are grown on land not suitable for the cultivation of food. Current bio-based processes are a crucial and necessary step in this transition to more sustainable, 2nd generation bio-based technologies.

DSM is committed to evaluating the sustainability impact of its use of biomass and believes that it is essential that an international legal framework, standards and certification systems are put in place to successfully manage these demands.

Bio-performance materials and 'traditional' chemistry

Central to DSM's strategy is the recognition that, whilst the importance of the bio-based economy will increase dramatically, it is not a panacea. We know that the bio-based economy is still an emerging economic system and that traditional, chemistry-based manufacturing is and will remain dominant for the foreseeable future. DSM is a world leader in performance materials and it will continue to use its expertise in chemistry to develop more advanced performance materials that complement and support its growing bio performance materials portfolio.

Bio-performance materials and biotechnology

Biotechnology is a versatile and powerful enabling technology that can be used to replace or complement traditional chemical, fossil fuel-based processes. Working alongside as well as in place of traditional chemistry, it is central to the bio-based economy.

With over 130 years' experience to draw on, DSM is an industry leader in the scientific and commercial application of biotechnology, using nature's toolkit of microorganisms and enzymes to manufacture bio-based products used in animal feed, vitamins, antibiotics, pharmaceuticals, among many other end products.

Maximizing the potential of biotechnology will help us develop new generation bio-performance materials. However it will also require companies to address ethical and political concerns around issues such as including genetic modification and competition with the food chain. Ongoing debates will continue and a more universal acceptance of the risk and benefits, as well the limits of science and technology will need to be achieved. This is a debate that we must play a lead role in, again working with our partners wherever possible, to educate and communicate about the long term benefits of the bio-based economy.

Bio-performance materials: the political and regulatory climate

The development of the bio-based economy - and therefore bio-performance materials - will be heavily influenced by the national and global political and regulatory environment.

Even with a supportive global framework, the bio-based economy is at an early stage in its development and needs further nurturing. Governments have a role to play in helping ensure industry is able to develop technologically and commercially in this crucial, early stage by using fiscal and legislative tools to foster more sustainable growth and innovation, and by ensuring security of supply for biomass - a significant and legitimate concern amongst potential customers.

As a business, DSM has a key role to play in ensuring that bio-based legislation and standards are 'fit for purpose' and will help to facilitate and not inhibit the development of bio-based processes, products and applications. We must also become more engaged in wider societal discussions about the bio-based economy, the implications of using bio-based feed stocks with regards to the food chain, land and water use, as well as the significant benefits it can deliver in terms of employment and rejuvenation of rural areas.

Bio-performance materials: macro-economic and geopolitical impact

The development of bio-performance materials, as part of the creation of a large scale bio-based economy, will bring significant economic change - and create opportunities for economic growth and jobs as a result. Much has been made of the 'green jobs' concept - the growth of a successful bio-based economy will create a whole range of employment opportunities, very many of them in rural areas where incomes and economic prospects are currently relatively low.

For example, from a European perspective, Ukraine, Poland and Eastern Germany could well see the growth of significant bio-refining sectors bringing much needed work to rural economies. Beyond Europe, the move towards a bio-based economy has the potential to significantly change the relative macro-economic and geopolitical standing of individual countries and regions. The emergence of the bio-based economy will result in new geopolitical relations, key determinant will be the availability of non-arable land conducive to the production of biomass, and the importance to particular countries of current fossil fuel based energy production.

Brazil and Africa may, for example, benefit greatly of a new bio-based economy. Brazil is one of the most advanced countries for biofuels, is a recognised global leader in industrial enzymes, and is learning to manage land and water issues in doing so. By virtue of its massive untapped agricultural assets, Africa could in the long-term develop a prominent position in biomass generation; a development that could transform its economy and societies. Many Middle Eastern countries could feel the biggest pressure of a global economic shift towards a bio-based economy that is less reliant on fossil-fuels. The fundamental macro-economic changes that will be driven by the emergence of the bio-based economy will have a major impact on the relative political standing of different countries and regions, and the nature of the political relations between these bodies.

¹ DSM's ECO+ solutions include products and services that, when considered over their entire life cycle, offer clear ecological benefits compared to the mainstream solutions they compete with.