INDUSTRIAL LEADERSHIP - Leadership in enabling and industrial technologies - Advanced materials

Specific objective for advanced materials

The specific objective of advanced materials research and innovation is to develop materials with new functionalities and improved in-service performance, for more competitive and safe products that minimise the impact on the environment and the consumption of resources. Materials are at the core of industrial innovation and are key enablers. Advanced materials with higher knowledge content, new functionalities and improved performance are indispensable for industrial competitiveness and sustainable development across a broad range of applications and sectors.

Rationale and Union added value

New advanced materials are needed in developing better performing and sustainable products and processes and for substituting scarce resources. Such materials are a part of the solution to our industrial and societal challenges, offering better performance in their use, lower resource and energy requirements, and sustainability during the entire life-cycle of the products.
Application-driven development often involves the design of totally new materials, with the ability to deliver planned in-service performances. Such materials are an important element in the supply chain of high value manufacturing. They are also the basis for progress in cross-cutting technology areas (for example healthcare technologies, biosciences, electronics and photonics) and in virtually all market sectors. The materials themselves represent a key step in increasing the value of products and their performance. The estimated value and impact of advanced materials is significant, with an annual growth rate of about 6% and expected market size of the order of EUR 100 billion by 2015.

Materials shall be conceived according to a full life-cycle approach, from the supply of available materials to end of life (cradle to cradle), with innovative approaches to minimise the resources (including energy) required for their transformation or to minimise negative impacts for humans and the environment. Continuous use, recycling or secondary end-of-life utilisation of the materials shall also be covered, as well as related societal innovation, such as changes in consumer behaviour and new business models.

To accelerate progress, a multidisciplinary and convergent approach shall be fostered, involving chemistry, physics, engineering sciences, theoretical and computational modelling, biological sciences and increasingly creative industrial design.

Novel green innovation alliances and industrial symbiosis shall be fostered allowing industries to diversify and expand their business models, re-using their waste as a basis for new productions.

**Broad lines of the activities**

**(a) Cross-cutting and enabling materials technologies**

Research on materials by design, functional materials, multifunctional materials with higher knowledge content, new functionalities and improved performance, and structural materials for innovation in all industrial sectors, including the creative industries.

**(b) Materials development and transformation**

Research and development to ensure efficient, safe and sustainable development and scale-up to enable industrial manufacturing of future design-based products towards a "no-waste" management of materials in Europe.

**(c) Management of materials components**

Research and development for new and innovative techniques for materials and their
components and systems.

(d) Materials for a sustainable, resource-efficient and low emission industry

Developing new products and applications, business models and responsible consumer behaviour that reduce energy demand and facilitate low-carbon production.

(e) Materials for creative industries, including heritage

Applying design and the development of converging technologies to create new business opportunities, including the preservation and restoration of materials with historical or cultural value, as well as novel materials.

(f) Metrology, characterisation, standardisation and quality control

Promoting technologies such as characterisation, non-destructive evaluation, continuous assessing and monitoring and predictive modelling of performance for progress and impact in materials science and engineering.

(g) Optimisation of the use of materials

Research and development to investigate substitution and alternatives to the use of materials and innovative business model approaches and identification of critical resources.

Context

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