

# STRATEGIC TOPICS



## SUSTAINABILITY

Efficient recycling and optimized material cycles have become a key topic for global economic and social development. Closing material cycles is essential for the development of new processing chains. For example, we are developing improved material formulations based on secondary raw materials, bio-based and recyclable material systems, energy-efficient processing methods and biobased, self-reinforced composite materials.



## FLEXIBLE MANUFACTURING TECHNOLOGIES

Industrial manufacturing requires increasing flexibility in view of product individualization. Economical implementation can only be achieved through shorter development and production times, greater production agility and the efficient use of resources. We are meeting these challenges in the development of modular and adaptable manufacturing technologies and process chains and the further development of additive manufacturing.



## ARTIFICIAL INTELLIGENCE

Using artificial intelligence to optimize products, processes and materials is one goal of digitalization. Against the background of our core competences in polymer and composite materials technology, we are using methods of machine learning and simulation to enable new processes and optimize existing ones. The development of digital twins of plastic processing processes and materials, and connection to a virtual production are a current research priority.



## LIGHTWEIGHT CONSTRUCTION

Lightweight construction conserves resources, energy and the climate. The sector-specific design and construction of lightweight solutions determines the selection process for suitable materials as well as the manufacturing process. At Fraunhofer ICT, polymer-based fiber composites and their hybrids are at the center of the developments. Key research topics are long- and continuous-fiber-reinforced polymers with a thermoset and thermoplastic matrix, and their hybridization. In close collaboration with the KIT, method, process, and material development is advanced.



## MATERIAL INNOVATION

Modern materials need to meet both structural and functional requirements. For this a profound understanding of material behavior is required as well as extensive know-how in material formulation. Current research focuses on functional materials which, in addition to their structural properties, have functionalities such as electrical or thermal conductivity, improved acoustic properties, scratch resistance or antibacterial properties. Programmable materials show a targeted reaction to changing environmental conditions or stresses. Sustainability along the value chain is becoming increasingly important. Our research therefore focuses on biobased material systems, material formulations on the basis of recycled components and novel recycling concepts.