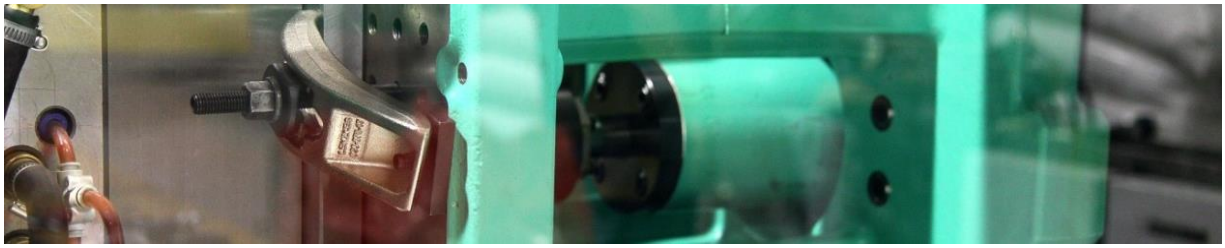
Research program

SYNTHETIC AND BIODEGRADABLE POLYMER SYSTEMS

Research and development of methods regarding preparation and processing of homogeneous and heterogeneous polymer (synthetic, biopolymer) and composite (nano, micro, long fiber and structural) materials. Research and development of material compositions and characterization of their structure and properties. Research on the processing of materials prepared in this way, including recycling and degradation, with possible applications to the design of parts for a wide range of industries (consumer, automotive, safety, medical, etc.).



Research activities

MULTIFUNCTIONAL POLYMER AND BIOPOLYMER MATERIALS

- Research on new, advanced, hybrid, hierarchical and multifunctional homogeneous and heterogeneous polymers and composites using available fillers and structures, obtained through non-traditional preparation processes from industrial and renewable sources to prepare specific materials with the desired properties.
- Characterization of material parameters, morphology and material properties for different types of fillers from nanometers through micro to macro dimensions for different application capabilities, from ultra-thin structures, light structures to standard parts.

PROGRESSIVE TECHNOLOGIES AND PROCESSES

- Research in the field of standard and advanced technologies in preparation and processing of polymers and composites including monitoring and parameterization of processes in the area of pre-production stage (kneading, granulation, 3D printing) as well as in the field of processing technologies (injection molding, microcell injection molding, composite processing, machining).
- Application research of technologies and processes in processing of polymeric and bio-polymeric materials and composites for foil (2D) and solid (3D) parts.
- Research and characterization of impacts of processing technologies on final and utility properties, filler dispersion, rheology, morphology, degradation ability.

SIMULATION OF PROCESSES S RELATED TO PARTS DESIGN AND MOLDS

- Application of simulation procedures and processes in the design and construction of plastic and bioplastics parts, composites and in the design and construction of molds for processing of synthetic and biopolymer materials with prediction of defects and defects in the application of modern technological methods of processing.
- Verification of systems and results using image analysis and testing methods and tests.

DEGRADTION AND RECYCLING OF POLYMERS AND COMPOSITES

- Research on mechanisms, processes and kinetics of degradation and recycling of synthetic and biopolymer materials and composites through recycling processes, anaerobic, aerobic and climatic tests including UV radiation, bacterial and seawater environmental and health aspects.

- Research on the influence of processes and methods concerning degradation and recycling properties of synthetic and biodegradable polymers and composites with the impact evaluation on application possibilities, life of components and environmental aspects.