




ALMA MATER STUDIORUM  
UNIVERSITÀ DI BOLOGNA

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## **MATERIALS FOR TRANSPORTS**

*Materials can enable industrial and commercial success of new products and processes, introducing new functionalities, improving properties and adding value.*

*The engineered production of materials for transport systems thus represents an invisible revolution; that might allow the development of products and infrastructures under a really sustainable systemic approach.*



The research at the University of Bologna on materials for transport applications profits from a wide range of scientific expertise, such as chemistry, physics, biology and engineering, as well as from all available technologies and multidisciplinary approaches, and a strong collaboration with industry and end users.

The University of Bologna provides a wide range of expertise on materials for application in transport systems:

- **Metals and metal matrix composites:** optimization of manufacturing cycles for tailored final properties, superplasticity, friction and wear behaviour heat treatment optimization microstructural and mechanical characterization of light alloys (Al, Ti, Mg, MMC); production and characterization of Al based nanocomposites
- **Polymer-matrix composite materials and metal:** design with FEM simulations, characterization of materials after thermal, hygroscopic or UV rays degradation, analysis of the crashworthiness properties of components using FEM simulations and experimental tests, development and optimization of technologies for the production of components with conventional and innovative composite materials, or innovative biocompatible ones; simulation of processes with FEA software
- **Metallic materials (conventional, lightweight and ultra-lightweight alloys):** tolerance to the detriment of aeronautical structures, Laser Shock Peening Process, analysis and optimization of processes of plastic deformation, development of systems for solid state welding of light alloys and ultra-light
- **New advanced graphene based polymer matrices:** for carbon fiber composites production, with improved properties
- **Materials for energy storage/conversion devices:** electrochemistry particularly inorganic, carbonaceous and polymer electrodes and ionic liquids for lithium batteries, supercapacitors and fuel cells, synthesis, characterization and assembly
- **Development and characterization of lithium-ion batteries for PHEV** (plug-in hybrid electric vehicles), development, characterization and assembly of Li-air battery for EV
- **Pavement Engineering:** recycling and alternative materials in pavements

#### HIGHLIGHTS

- H2020 [CARIM](#) - Commercialization of a full carbon wheel manufactured with an automated high-volume process for the automotive market
- FP7 [THERMACO](#) - Smart Thermal conductive Al MMC's by casting