

## MACE

### Innovative Composite Materials for civil application

#### IMAST members involved:

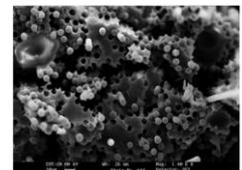
- **Consorzio TRE** – Technology for Building Renovation
- **University of Naples "Federico II"** - Department of Engineering of Materials and Production (**DIMP**) and Department of Structural Analysis and Design (**DAPS**)
- **CNR** - Institute for Composite and Biomedical Materials (**IMCB**)

Nowdays, extraordinary repair, the restoration and the updating innovation allowing the improving of the traditional materials performance. The prevention of damages of the structures as consequences of seismic phenomena is another important issue, especially in Italy where the architectural heritage consists mainly of structures in reinforced concrete and masonry. The use of polymeric or inorganic composite materials provides an effective repair method because of the possibility to modulate their mechanical functional characteristics, their service life and lightness during the design process.

#### Achievements

In framework of MACE project have been developed:

1. new Epoxy Fiber Reinforced composite (FRP) and Grout Fiber Reinforced composite (FRG) whit increased substrate/reinforcement compatibility and better properties of flame resistance compared to materials already present in the market. Adhesion improvement between reinforcement and substrate and +8% improvement of reinforcement tensile elongation were obtained with FRP composite;
2. new technologies to monitor the quality of the reinforcements from their installation to their performance in use. In this activity a study of new integrated techniques to control both the substrate and its treatment and the quality of the reinforced infrastructure by semi-destructive and non-destructive tests were performed. Moreover, a study of the applicability of the optical fibres as checking tool and a verification and validation of the developed techniques were conducted. A tool to identify the most appropriate maintenance request with time and costs reduction has been developed.
3. new nanostructured materials focusing the attention on their physical-mechanical properties, durability, on new technologies to investigate the nanomaterial structures and the modelling in order to verify the applicability of the nanotechnology in the building sector.



The new developed materials can be used, even, for structural renovation and consolidation of buildings in the warmer areas of the Mediterranean basin. Besides, new FRG composites, with permeability behaviour, are eco-friendly with the architectural heritage.