



investiamo nel vostro futuro



FUZI - Polymeric systems with integrated functionalities

IMAST members involved:

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- **CIRA S.c.p.A.** – Italian Aerospace Research Center
- **CRF S.c.p.A.** - FIAT Research Center
- **STMicroelectronics S.r.l.**
- **CNR** - Institute for Microelectronics and Microsystems (**IMM**) and Institute of Chemistry and Technology of Polymers (**ICTP**)
- **Selex Electronic Systems**
- **University of Naples Federico II** - Interdepartmental Research Center on Biomaterials (**CRIB**)
- **MBDA Italy S.r.l.**
- **ENEA** - Italian National agency for new technologies, Energy and sustainable economic development

The purpose of this project is the development of **new smart materials able to monitor and react to the environmental changes**. These materials, due to their ability to correlate electrical, physical, chemical and mechanical properties, are the key elements of integrated systems for applications in the automotive, aeronautical, aerospace, microelectronic/biomedical and telecommunications. The project structure is composed of three thematic areas: **structural/semi-structural health monitoring, bio-health monitoring and electromagnetic sensing monitoring**.

In the frame of structural and semi-structural health monitoring, polymeric composite systems will be developed with shape memory and electrical properties for active and adaptive structure by using **piezoelectric materials and inorganic fillers**. Moreover algorithms for diagnosis and prognosis will be implemented in a **structural health monitoring** methodology. For the automotive sector functional composite systems will be realized with **sensing and morphing** properties. For the aeronautic sector a **composite system** for structural monitoring and an integrated system for **inverse Finite Element Method (IFEM)** analysis will be developed.

In the frame of Bio-Health Monitoring **micro and nano-biosensors** able to monitor **physiological parameters** (glucose and extravascular blood pressure) will be developed by using polymeric materials and technologies of Printed Electronics.

In the frame of shielding and filtration of electromagnetic waves, functional composite systems and a **Radome** with **frequency selective surface (FSS)** will be realized by including appropriate filler into polymer matrix and by inserting a conductive layer into fiber-reinforced polymer.

