Nanoinnovation Abstract 4 August 2025

Title: Safe and Sustainable by Design additives for multifunctional composites

Abstract: Fiber fabrics reinforced composites have been emerging technologies in last decades (carbon fiber first emerged in the aviator sector in the 1980s) with structural applications, being an alternative to metallic parts. Structural functions of these types of hierarchical composites are well known and are nowadays used in important sectors, as wind-energy, sports aeronautic and automotive. Intense research for achieving multifunctional properties of these composites is being developed; i.e. heat dissipation, self-structural monitoring (SHM) or the capacity to shield against electromagnetic interferences. Beside the functionality during the life, also there are significant efforts in the use of additives to help during the manufacturing (to reduce the energy and time for curing) and at the End-of-Life (EoL), looking for recyclable and reusable materials.

Thermosetting fiber fabrics reinforced composites with up to 85% of energy savings during the manufacturing have been obtained and new techniques for the placement of SHM embedded systems have been carried out. It has been developed all in polymer solutions, with the electric circuits integrated in the resin matrixes. These new solutions have been tested to be recyclable and will contribute to pave the way for the applications of these structural composites in industries as automotive and aerospace.