Politecnico di Torino

DISAT

Prof. Alberto Jiménez Suárez

Universidad Rey Juan Carlos

Alberto Jiménez Suárez is a full professor at the Universidad Rey Juan Carlos where he holds the position of deputy director of End-of-Master Thesis, external internships, and relations with companies in the School of Official Masters. He is co-IP of the Smart and Sustainable Polymers and Composites group. He has more than 16 years of postdoc experience in the field of adding new functionalities to polymer matrices by adding different types of nanoparticles. These polymer matrices have been used to impregnate continuous fibers to produce multiscale reinforced composites, adhesives, bulk materials produced by conventional casting, and 3D-printed parts, among other uses. He has more than 115 papers published according to the Scopus database with an h-index of 27.

Towards multi-functionality and sustainability of thermoset-based composites for transportation and energy industry

The seminar deals with the different alternatives addressed by the research group to manufacture a new generation of thermosetting materials, mainly epoxy resins or acrylate-based resins for 3D printing that present advantages in some of their life cycle or to which multi-functionality is conferred to increase their attractiveness in the industry.

The incorporation of nano-reinforcements allows for obtaining new electrical and thermal functionalities while the density is not substantially modified, and the mechanical properties remain constant or even improved. The final result after incorporation depends largely on the dispersion achieved, so selecting an optimal dispersion procedure will affect the electrical, thermal, and mechanical properties achieved. In addition, the dispersion procedures chosen will affect the ease of industrial implementation.

The use of a monomer of natural origin based on the epoxidation of resveratrol is proposed, which has shown excellent thermal behavior, allowing it to operate at high temperatures in service and to have very good flame behavior, thus avoiding the use of flame retardants. This material has also been successfully used to impregnate carbon fibers, resulting in composite materials that avoid the use of petrochemical-based monomers. The results obtained developing adaptive covalent networks (CANs) through disulfide bonds and Diels-Alder adducts will also be shown. They have shown good results in chemical recycling, temperature forming capacity once cured, self-repairing capability, and sensing (when modified with nano-reinforcements), which allows affecting all stages of their life cycle.

Wednesday November 6th 2024, 9:30-10:30 Aula Denina DISAT