

MATERIALS SCIENCE AND TECHNOLOGY

DM 630/MAT3D Srl - Additive manufacturing (vat photopolymerization) of resins with vitrimeric properties (Waiting list)

Funded By	MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [P.iva/CF:97429780584] MAT3D S.R.L. [P.iva/CF:02756070351]
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Context of the research activity	<p>Vitrimers are a new class of polymer systems with properties in between those of conventional thermoplastic and thermoset materials. On the other hand, additive manufacturing (AM) is an emerging technology for the production of components with very complicated geometries and with the production of a very limited amount of waste. The development of new materials able to be processed by AM represents a very challenging topic for development of advanced materials and technologies.</p> <p>Progetto finanziato dal PNRR a valere sul DM 630/2024 - CUP E14D24002460004</p> <p>The activation of the position with scholarship is subject to the possible allocation of further funding by the MUR.</p>
Objectives	<p>Research activities will be carried out in close collaboration with MAT3D s.r.l., a small but dynamic Torino-based company active in the production of innovative materials for polymeric additive manufacturing (AM).</p> <p>Experimental activities will be focused on the design and development of photocurable resins suitable for vat photopolymerization AM technologies (SLA stereolithography, DLP digital light processing, etc.) and able to produce cured materials with vitrimeric properties (i.e. properties in between those of conventional thermoplastic and thermoset materials).</p> <p>After a detailed bibliographic search, the synthesis and/or chemical modification of photocurable resins having chemical and physical properties suitable for their processing with vat photopolymerization AM technologies will be investigated. The raw materials will be fully characterized from a chemical-physical point of view. The processability/printability of the materials will be investigated in order to optimize the processing parameters for the production of specimens and parts with specific geometries. The printed</p>

specimens/parts will be fully characterized in order to investigate thermo-mechanical ultimate properties, dimensional accuracy and, most importantly, the ability to show the required vitrimetric behavior.

During the three-year course the PhD students will spend research periods in MAT3D and in international research centers. The participation to national and international conferences and schools will be also strongly encouraged.

Skills and competencies for the development of the activity

Candidates should have a strong background in materials science and engineering and/or materials chemistry, as well as a high motivation to learn through advanced research.

Expertise in chemical functionalization of photocurable resins and/or vat photopolymerization and/or polymer characterization and/or mechanical testing and/or thermal-rheological properties characterization is appreciated.

Practical attitude for the lab activities and problem-solving skills are also appreciated.