

MATERIALS SCIENCE AND TECHNOLOGY

Ateneo - Design of bio-based adhesives

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| Context of the research activity | Adhesives with polymeric bases are crucial for joining various surfaces across numerous applications. Environmental concerns and the demand for sustainable materials have driven researchers to explore innovative strategies for improving the recyclability of polymeric adhesives. This research activity aims at examining potential solutions for incorporating bio-based covalent adaptable networks into thermoset adhesives to enable recycling. |
| Objectives | <p>Adhesives with polymeric bases are crucial for joining various surfaces across numerous applications. Environmental concerns and the demand for sustainable materials have driven researchers to explore innovative strategies for improving the recyclability of polymeric adhesives. Typically, these adhesives are thermoset-based, making them infusible and insoluble. This research activity aims at examining potential solutions for incorporating bio-based covalent adaptable networks into thermoset adhesives to enable recycling.</p> <p>It is increasingly important for adhesive applications to transition from using fossil-based materials to utilizing materials from bio-renewable sources. This shift is being implemented through the optimization of adhesive precursor design, enabling recyclability by leveraging the CAN phenomenon.</p> <p>The objectives of this research are to develop new polymeric materials with adhesive properties derived from renewable sources that exhibit thermomechanical behavior comparable to traditional fossil-based adhesives. Additionally, the study will focus on optimizing debonding techniques for bonded systems, considering the temperature ranges in which the adhesive will be used.</p> <p>The adhesives will be tested and characterized for bonding similar and dissimilar materials, including various classes such as metals, ceramics, and composites.</p> |
| Skills and competencies | <p>The following knowledge and skills are required:</p> <ul style="list-style-type: none"> - Basic knowledge of materials families (properties and structure) and processes (acquired in dedicated BSc and MSc lectures). |

**for the
development of
the activity**

- Basic knowledge of thermal and mechanical properties of thermosetting and thermoplastic polymeric materials.
- Basic knowledge of characterization methods for polymeric/metallic/ceramic materials