

Healable Coatings and On-demand Debondable Adhesives Derived from Covalent Adaptable Networks

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Adhesives are omnipresent in a myriad of materials used in our daily lives, as recognised by the continuous global growth of the adhesive market. Yet, challenging times lie ahead when considering the disassembly of those multi-materials to allow their structural repair or their recycling. Therefore, the design of adhesives with switchable properties that allow for the formation of reversibly bonded joints is highly desired. A related challenge in our society is the need for durable coatings with long-term corrosion protection that can be reworked or healed after their application.

In this course, I will first describe how such debondable adhesives and coatings can be prepared and characterized. Then, several examples, developed in the Polymer Chemistry Research group of Ghent University, will be discussed and it will be demonstrated how researchers with a different background can implement dynamic crosslinks into epoxy and other matrices, based on commercially available bulk chemicals. It will be emphasized how to deal with the critical trade-off between strong bonding and easy debonding. As a result, attractive drop-in strategies will be discussed, producing debondable and rebondable adhesives, with high complementarity to existing adhesive resin technologies and applicable in an industrially relevant temperature window.