

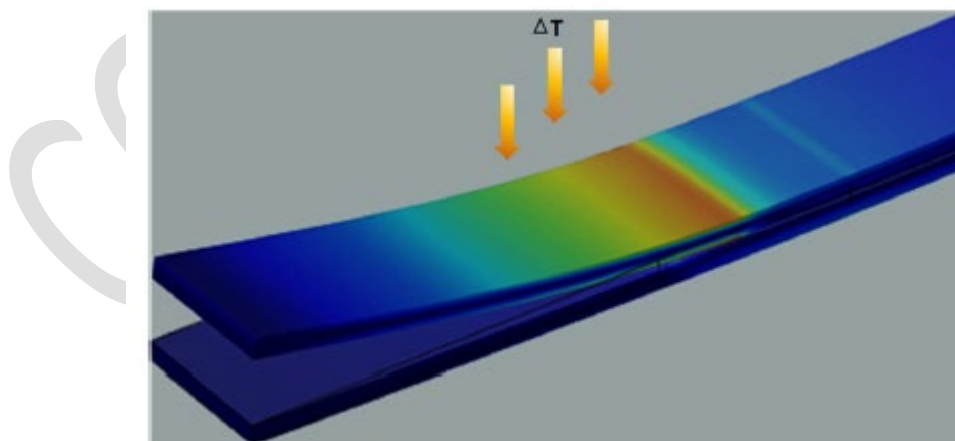
Abstract ReSet-2

Dynamic crosslinking chemistries for on-demand debondable adhesives, full cSBO with a proposed starting date on 1 January 2022 and a proposed duration of 30 months, with research partners UGent and VUB. Follow-up project of the currently running Moonshot sprint cSBO project ReSet (<https://moonshotflanders.be/mot2-reset/>).

ReSet-2 is a continuation of the sprint project ReSet (Recyclable thermosets) in which the applicants will only focus on the implementation of dynamic crosslinking chemistries for on-demand debondable adhesives. After direct contact with all relevant adhesive companies in Flanders recently, it became clear that the importance of adhesive bonding technology is expected to grow quite significantly as a result of a multitude of industry trends, driven by environmental as well as economic reasons. For example, within the automotive industry the growth in adhesives usage is driven by the need to reduce weight, improving fuel economy and electrification of vehicles. On the other hand, within the construction industry, modular and prefab building techniques as well as improving the overall energy efficiency of buildings are key drivers. Changing EU policies such as the “European Green Deal” provides a strong push to transition from linear towards circular economy models and material streams. In the coming years, much progress will thus have to be made to substantially increase the durability, maintenance, repair, remanufacturing and recycling of goods. However, current adhesive solutions – around 50% reactive one/two-component (1K or 2K) systems – result in permanently crosslinked adhesives. While they are designed to provide long-term stability, they hamper material circularity. Thus, the development of new technologies and processes for easy recycling and reuse of bonded materials and thus keeping carbon in materials in circulation throughout the value chain, is of utmost industrial interest. It has therefore been recognized that on-demand debondable adhesives should become a key technology for facile and controlled/triggered disassembly of adhesively bonded products (multimaterials) in the upcoming decade.

Starting from the knowledge build-up during the sprint SBO, ReSet-2 will focus on two thermally triggered reversible adhesive platforms. On the one hand, a novel tuneable dynamic chemistry platform is targeted towards the development of different types of debondable structural adhesives. On the other hand, a next generation of pressure sensitive adhesives (PSA) will be aimed for by the implementation of an acrylic-based dynamic chemistry platform. Besides the further application of cutting-edge in-silico engineering tools and in-depth characterization of the material properties (e.g. rheology, adhesive properties,...), a high throughput approach will be developed to broaden the screening of adhesive formulations and to speed up the design and industrial uptake of the new adhesive materials in sectors ranging from transportation to construction.

Schematic representation of temperature triggered on-demand debondable adhesives



For substantive questions about this project proposal, please contact MOT2 representative Wannes Libbrecht (wlibbrecht@catalisti.be; +32 499 315 604).