Itaconic acid as versatile building block for bio-based polymers

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Over the last years itaconic acid has drawn considerable attention as novel renewable building block for bio-based polymers. It is produced via a biotechnological process in large quantities (>80.000 t/a) and at competitive prices (~2 €/kg), which makes it a very attractive monomer also from an industrial point of view. It has been used as (co-)monomer in radical polymerization reactions, as well as polycondensation reactions with a wide range of applications.
Herein we present our most recent work on itaconic acid-based polymeric materials. First, UV-curing materials with a focus on additive manufacturing as alternative to standard (meth)acrylic acid-based materials will be shown. Depending on the composition of the poly(ester itaconates) a wide range of thermal and mechanical properties of the cured materials can be obtained. Subsequently, the synthesis of structurally different itaconic esters and their application in radical polymerization will be reported. Here a significant influence of the different ester groups on the reactivity of the radical polymerization reaction was observed, which could help to further improve the radical polymerization of itaconic acid-based materials.