

Chemical Recycling, Upcycling of Polyesters by Catalysis

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Chemical recycling, chemical conversion of plastic wastes to raw materials (monomers), and the conversion to fine chemicals (upcycling) have been important technologies especially in terms of circular economy. Polyesters, exemplified as poly(ethylene terephthalate) (PET), are widely used as commodity thermoplastics, and PET has been reused by called mechanical recycling. However, due to the inferior quality of the reused resin, the importance of chemical recycling has thus been pronounced.

We recently demonstrated the acid-, base-free catalytic depolymerization through transesterification with various alcohols, and the reaction proceeds with exclusive selectivity. The catalysis thus enabled one-pot closed-loop depolymerization–repolymerization and upcycling of polyesters affording the other polymers. Recently, chemical conversions of PET with amines could also be demonstrated. The depolymerizations of PET wastes (textile, plastic mixtures, composites etc.) with alcohols also afforded the corresponding diesters in exclusive yields under scale up conditions.

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References

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