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Rhodium Catalysed Deconstruction of Epoxy Resin in Water

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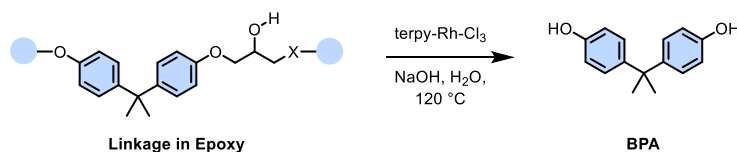
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ABSTRACT

Thermoset epoxy resins and their fibre reinforced composites have excellent resistances to chemical exposure and mechanical stress. Meant for structures designed to last, such as coatings, airplanes, or wind turbines, deconstruction and recycling of epoxy is highly challenging, and thus underdeveloped¹. To achieve circular economies for plastics, which reduce waste accumulation and resource consumption, efficient depolymerisation strategies are necessary, which optimally adhere to the principles of green chemistry, such as atom efficiency and the use of green solvents². For the valorisation of lignin, terpy-Rh complexes have been shown to be efficient depolymerisation catalyst in water³.

Here, we present a rhodium catalysed approach to selectively cleaving C(Alkyl)-O bonds in epoxy resins in mild conditions with water as sole solvent. The reactivity was investigated on model compounds mimicking the linkages of epoxy polymers. Furthermore, we demonstrate the recovery of the polymer building block bisphenol A from commercially used thermoset epoxy polymers.



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