

Catalyst Free Agriculture Waste Derived Activated Carbon-based Epoxy Vitrimers [†]

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Abstract: In recent years, vitrimeric materials have emerged as fascinating and sustainable materials owing to their malleability, reprocessability, and recyclability. Sustainable vitrimeric materials can be prepared by reinforcing bio-derived monomers or fillers in the polymeric matrix. In this work, a sustainable vitrimer is prepared by incorporating biomass-derived activated carbon (AC) fillers in the epoxy matrix to achieve enhanced thermal and mechanical properties. The biocomposite vitrimers thus prepared demonstrate a lower-temperature self-healing (70 °C for 5 min) wherein healing was accomplished through disulfide exchanges (compared to the pristine epoxy (80 °C for 5 min). Interestingly, while the healing efficiency, as examined by flexural studies, has delineated 73% and 60% recovery values for the epoxy, higher values of 85% and 70% of recovery (after two consecutive healings) have been found for the formulated biocomposites.

Keywords: vitrimers; self-healing; biocomposites; activated carbon.

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Conflicts of Interest

The authors declare no conflict of interest.