

Polybenzoxazine Alloys and Composites as Functional Materials

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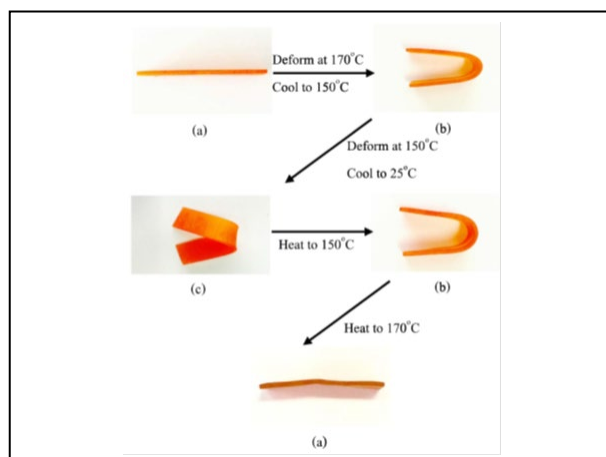
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One useful characteristic of benzoxazine resin is its ability to alloy with various kinds of resins or polymers. In this research, we describe an ability of benzoxazine resin to alloy with epoxy and urethane resins to form polymers with shape memory properties as well as with thermo-reversible light scattering (TRLS) characteristics. The dual function of benzoxazine resin to act as curing agent of epoxy resin and as a stable or rigid network segment for shape memory epoxy significantly simplifies a formulation of shape memory epoxy systems with enhanced recovery stress. Recovery stress enhancement and microwave activating capability can also be obtained with an incorporation of silicon carbide whisker in the alloys. Furthermore, the alloys of benzoxazine resin with suitable urethane elastomers provide relatively broad glass transition temperature with multiple-shape memory effects. These classes of benzoxazine-urethane alloys also show interesting thermo-optical characteristics namely thermo-reversible light scattering behaviors that the materials can be switched from opaque state (off-state) to transparent state (on-state) by varying temperature. TRLS films have potential applications in thermal sensors, optical devices, recording media etc.

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Multiple shape memory performance of benzoxazine-urethane polymer alloys.

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