Bio-Inspired Energy Dispersive Composites

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ABSTRACT:

In nature, many organisms must withstand frequent, large, transient loads; so they have evolved materials that dissipate energy effectively. Some mechanisms used to achieve this energy dissipation are molecular assembly with nano/meso domain definition, 3D hierarchical structure and function, multicomponent hybrid compositions, gradient interfaces, structural confinement, compliant elastic matrices and reversible cross-linking networks. We propose to design lightweight materials based on these energy dissipating mechanisms. In this work, we present a procedure for isolating a poly-vinylimidazole (PVIm) film which allows for the formation of hidden lengths and sacrificial bonds through complexation of the functional group with metal ions. We also share IR results showing that complexation occurs in the polymer film, validating our procedure for isolating and crosslinking PVIm.

KEYWORDS: energy dissipating, hidden lengths, sacrificial bonds, polymer film, cross-linking

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