

## EFFECT OF REACTIVE RUBBER NANOPARTICLES AND NANOCCLAY MIX ON THE MECHANICAL PROPERTIES OF EPOXY

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**Summary:** While epoxy is the most used adhesive in structural applications, it suffers from brittle behavior at failure and relatively low energy absorption (toughness). The main objective of this work is to examine the effect of incorporating a mix of reactive rubber nanoparticles (RRNP) and organically modified nanoclay (Cloisite-30B) into the epoxy matrix with the aim of improving material toughness without compromising its desired strength and stiffness. Epoxy (amine based) hybrid nanocomposites containing RRNP, Cloisite-30B and a mix of RRNP/Cloisite-30B were synthesized and mechanically characterized. Mechanical characterization was performed using the nanoindentation technique to extract the elastic modulus and toughness of the material. 10m Spherical indentation tip was used to probe the surface of the epoxy nanocomposites. Microstructural characterization using X-ray diffraction (XRD) and transmission electron microscopy (TEM) was performed to investigate the significance of nanoclay exfoliation on the mechanical properties. Furthermore, Incorporation of RRNP results in softening the epoxy nanocomposite and lowering its stiffness and thus improving its toughness compared with neat epoxy. In contrast, incorporation of Cloisite-30B increased the stiffness and lowered the toughness of the epoxy/nanocomposites compared with neat epoxy. The balance between RRNP and Cloisite-30B led to hybrid nanocomposites with improved energy absorption and acceptable stiffness for structural applications.