



The Studies on Properties of Epoxy-Graphene Nano Composites

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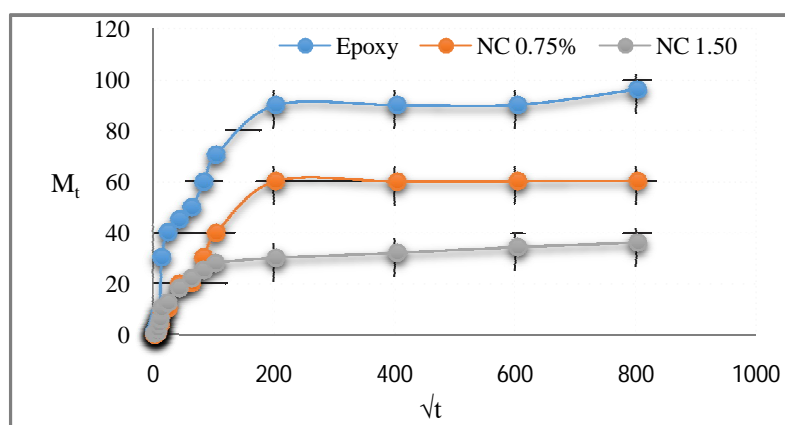
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ABSTRACT

The water sorption and diffusion in (reduced) graphene epoxy nanocomposites of various compositions (0.75 and 1.5g) is analyzed. Water sorption of epoxy membrane can be significantly reduced by the inclusion of graphene oxide sheets due to the formation of an extensive hydrogen bonding network between oxygenated groups. Crosslinking of epoxy groups with divalent metal ions and the presence of reduced graphene oxide can further improve the swelling resistance due to the strong interactions between metal ions, epoxy group, and filler sheets. Depending on conditions and composition, the overall water barrier properties of epoxy graphene nano composites improve upon (reduced) graphene oxide filling, making them attractive for moisture barrier coating applications. Water sorption kinetics in all epoxy composites indicates a non-Fickian diffusion process. In addition, the water barrier properties of epoxy-graphene oxide composites can be adequately predicted using permeation coefficients calculated from sorption and diffusion coefficients.

Graphical Abstract:



Sorption kinetics of epoxy specimens for moisture absorption for the epoxy and the epoxy filled with 0.75wt and 1.5 wt. % of nanoparticles in an atmosphere with 91% during moisture absorption.

Keywords: Epoxy-graphene nano composites, Overall water barrier properties of epoxy graphene nano composites, Kinetics, Diffusion properties.