

THE EFFECT OF AMOUNT OF GRAPHENE ON SORPTION, DIFFUSION AND PERMEATION FOR THE STUDY OF BARRIER PROPERTIES OF EPOXY- GRAPHENE NANO COMPOSITES

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ABSTRACT

The water sorption and diffusion in (reduced) graphene epoxy nanocomposites of various compositions (0.75 & 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 nanocomposites improve upon (reduced) graphene oxide filling, making them attractive for moisture barrier coating applications. Water sorption kinetics in all epoxy composites indicate 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.

Keywords: - Sorption, diffusion , graphene swelling

