

Diffusivity and solubility of oxygen in graphene/polymer thin films

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Graphene, a single layer of two-dimensional carbon atoms, has attracted much attention due to its remarkable properties. Composites of poly (vinyl alcohol) (PVA)/graphene oxide (GO) and ethylene vinyl alcohol (EVOH)/GO were synthesized by modified Hummers method and a solution-mixing method. GO was nearly exfoliated in the polymer/GO composites. We can obtain the transparent, flexible, and gas barrier polymer/GO films. GO is itself an excellent gas barrier without any reduction. The oxygen permeability of the PVA/GO (0.3 wt.%) composite was 4 times lower than that of the pure PVA film, with 92 % light transmittance at 550 nm. The oxygen permeability of EVOH/GO (0.3 wt.%) composites was reduced to 61 % of that of EVOH, with 85 % light transmittance. Both diffusivity and solubility of oxygen in PVA/GO and EVOH/GO composites are reduced by dispersing GO into polymer.