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Ultra-strong polyethyleneimine-graphene oxide nanocomposite film via synergistic interactions and its use for humidity sensing

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Abstract

The ternary roles of polyethyleneimine (PEI) as a polymer matrix, a reducing agent and a surface modifier have been presented to fabricate graphene oxide (GO) reinforced polymer nanocomposite films. GO is modified with PEI-glycerol diglycidyl ether (GDE) cross-linking networks in aqueous solution and *in situ* reduced by PEI simultaneously. Synergistic reinforcement of mechanical interlocking and hydrogen bonding leads to dramatic increases in tensile strength and Young's modulus by 98.3% and 87% respectively, at 7.5 wt% GO loading of PEI. The partial reduced GO sheets serve as moisture barriers for water-soluble PEI, and the nanocomposite films are shown to be structurally robust humidity sensors over the

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