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# Synthesis and Characterisation of Graphene based Metal Oxide Nanocomposites for Photocatalytic Degredation of Organic Pollutants

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**Abstract—***The NiO/GO nanocomposites as efficient photocatalysts, with different feeding ratios of NiO to GO, were successfully synthesized by an in-situ method without the use of any stabiliser or surfactant using GO and nickel nitrate as the starting material. X-ray diffraction (XRD), scanning electron microscopy (SEM), and photoluminescence (PL) spectroscopy were used to characterize the as-synthesized nanocomposites. The average crystallite size of NiO sample was calculated using Scherrer's formula and was found to be around 10.0 nm . The peak broadening has also been found on introducing NiO into the GO matrix, that resulted in the reduction in grain size of NiO (9.0 nm) that can be attributed to the amorphous nature of GO. The SEM images of nanocomposites reveals the spherical morphology of NiO nanoparticles existing on GO sheet and are randomly distributed on it. The results proved that the concentration of graphene oxide in starting solution displayed an important role in photocatalytic performance of NiO/graphene oxide nanocomposites. Moreover, the photocatalytic activity of the as-prepared NiO/GO nanocomposites for the degradation of Rhodamine (Rh-B) was much higher than that of pure NiO nanoparticles, which can be attributed to the formation of p-n heterojunction in the NiO/GO nanocomposites. The photocatalytic activities of the composite were higher than that of P25 (a commercial $TiO_2$ as a benchmark photocatalyst). The enhancements of photocatalytic activity can be attributed to the high separation efficiency of photogenerated electrons and holes resulting from the interaction between NiO and GO. The high seperation of photogenerated charge carriers and their inhibited recombination was further confirmed from PL spectroscopy.*

**Keywords***: photodegredation; photocatalyst; nanocomposites; heterojunction; Graphene oxide;*