International Journal of Advance Research in Science and Engineering
Vol. No.6, Issue No. 06, June 2017
www.ijarse.com
IJARSE
ISSN (O) 2319 - 8354
ISSN (P) 2319 - 8346

SYNTHESIS OF GRAPHENE OXIDE/NIO NANOCOMPOSITES: ROLE OF 2D GRAPHENE OXIDE IN THE ENHANCEMENT OF PHOTOCATALYTIC ACTIVITY FOR THE DEGREDATION OF ORGANIC POLLUTANTS

Jahangir Ahmad[1], Kowsar Majid[2]

Department of Chemistry, National Institute of Technology, Srinagar (J&K) 190 006, (India)

ABSTRACT

The NiO/GO nanocomposites as efficient photocatalysts, 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 in an controlled atmosphere. Graphene Oxide is synthesised via eco-friendly method and the NiO nanoparticles displaying spherical morphology, are randomly distributed on the surface of GO sheets. The as-synthesised nanocomposites were characterised by different characterisation techniques like X-ray diffraction (XRD), scanning electron microscopy (SEM), and FTIR spectroscopy. The average crystallite size of the nanocomposites was calculated using Scherrer's formula and was found to be around 9.0 nm. The results suggested that the concentration of graphene oxide in starting solution has an important role in the enhancement of photocatalytic activity of the nanocomposites. These semiconductor heterojunctions have been demonstrated as highly efficient photocatalysts with enhanced performance for the degradation of a organic pollutant, Methylene blue (MB). Moreover, the photocatalytic activity of the NiO/GO nanocomposites was much higher than that of pure NiO nanoparticles, which can be attributed to the formation of p-n heterojunction in the nanocomposites. The photocatalytic activities of the composite were higher than that of P25 (a commercial TiO_2 as a benchmark photocatalyst). The characterisation results exhibited significantly improved photocatalytic activity of the nanocomposites which could be attributed to the high charge seperation and suppressed recombination of photogenerated electron-hole pairs due to GO.

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