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Photocatalytic polymerization of methyl methacrylate over neat and nitrogen doped anatase

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ABSTRACT

Nitrogen doped anatase was prepared by annealing TiO_2 (anatase form) powder in a stream of ammonia gas under heating at a constant heating rate for three hours with a constant flow rate of NH_3. Doping reaction was performed at 400^o,500^o, and 600 °C. The modified titania was characterized by CHN, BET, XRD and UV-visible spectroscopy. It was found that doping nitrogen doesn't alter crystallinity of anatase as it was found from XRD patterns. Both Neat and nitrogen doped anatase used to initiate photocatalytic polymerization of methyl methacrylate (MMA) from an aqueous solution under irradiation with UV light from middle pressure mercury lamp. The resulted polymer was investigated by FTIR, NMR, SEM, TGA, XRD and GPC. The activity of reaction was calculated as a conversion percentage of monomer to the polymer against irradiation time. The photocatalytic activity of polymerization reaction falls in the following sequence anataseN500> anataseN400> anatase neat> anataseN600.

Keywords: TiO_2, N/TiO_2, nanocomposite materials, photocatalytic activity of titania.