ABSTRACT

Carbon nitride (C_3N_4) nanosheets (NSs) were synthesized through pyrolysis of urea. Various concentrations (0.1, 0.2, 0.3 wt. %) of C_3N_4 were incorporated in the composite of nitogen-doped titanium dioxide (N/TiO_2) to attain binary-doped nanostructures. Six samples were prepared and named as TiO_2, nitrogen-doped TiO_2 (N/TiO_2), C_3N_4 and different concentrations of C_3N_4 in N/TiO_2 named as 0.1:1, 0.2:1, 0.3:1. The prepared samples were undertaken to estimate structural, morphological as well as optical properties of binary-doped TiO_2 nanostructures. In this regard, XRD has employed which revealed the hexagonal structure of C_3N_4 with an improved crystallinity. The optical properties were measured by absorption spectra that was taken from transition spectroscopy which showed the absorption towards the visible region and caused red-shift upon doping. The morphology of C_3N_4 and binary-doped TiO_2 nanostructure was evaluated by scanning electron microscope (SEM) and high-resolution transmission electron microscopy (HR-TEM). The HR-TEM study find out porous NS like structure of C_3N_4. Upon doping, pores were filled with N/TiO_2 mixture and also wrapped by the NS. Energy dispersive X-ray (EDX) study was used for the identification of elements of as-synthesized samples that showed signals of C, N, Ti, O and Na. Lastly, binary-doped nanostructures were used as nanocatalyst for the degradation of dyes. Methylene blue (MB) and ciprofloxacin (CF) were attained as pollutants or dye to check the rate of degradation in presence of reducing agent (sodium borohydride ($NaBH_4$)).