Layered $Na_2W_4O_{13}$ and its Cation/anion doped analogues for the treatment of polluted water

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ABSTRACT

The ultimatum for the visible light active catalysts for the degradation of organic pollutants in waste water and to engender clean energy source like H_2 from H_2O increases tremendously from the last two decades. Therefore, the present work aimed at the synthesis, characterization and photodegradation studies of visible light active cation/anion doped $Na_2W_4O_{13}$ (NaWO) catalyst. NaWO was synthesized by ethylene glycol assisted sol-gel method. The divalent tin and trivalent nitrogen doped NaWO were prepared by ion exchange and solid state methods, respectively. Structural, morphological and optical properties of these materials were characterized by XRD, FESEM, XPS and UV-visible diffuse reflectance techniques. The composition of tin and nitrogen doped NaWO were obtained from EDS. The lattice parameters of these materials were measured from Powd software, by least square fitting of their *d*- values. Substitution of K^+ by Sn^{2+} and N^{3-} led to a shift of absorption onset to longer wavelengths. The photocatalytic activity of all the samples was evaluated by photodegradation of rhodamine B. The mechanistic degradation pathway of rhodamine B (RhB) was studied using radical quenchers. The removal of Pb^{2+} from an aqueous solution of $Pb(NO_3)_2$ using $Na_2W_4O_{13}$ was discussed.