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# Synthesis, Characterization and Photocatalytic Performance of Visible Light Induced Materials

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**Abstract :** Nano-crystalline materials of pure and metal-doped semiconducting materials have been successfully synthesized using sol gel and hydrothermal methods. The prepared materials were characterized by standard analytical techniques, i.e., XRD, SEM, EDX, UV–vis Spectroscopy and FTIR. The (XRD) analysis showed that the obtained particles are present in partial crystalline nature and exhibit no other impurity phase. The EDX and (SEM) images depicted that metals have been successfully loaded on the surface of the semiconductor. FTIR showed an additional absorption band at 910 cm−1, characteristic of absorption band indicating the incorporation of dopant into the lattice in addition to a broad and strong absorption band in the region of 410–580 cm−1 due to metal–O stretching. The UV–vis absorption spectra of synthesized particles indicate that the doping of metals into the lattice shift the absorption band towards the visible region. Thermal analysis, measurement of the synthesized sample showed that the thermal stability of pure semiconducting material is decreased due to increase in dopant concentration. The photocatalytic activity of the synthesized particles was studied by measuring the change in concentration of three different chromophoric dyes as a function of irradiation time. The photocatalytic activity of doped materials were found to increase with increase in dopant concentration.

**Keywords :** photocatalysis, metal doped semicondcutors, dye degradation, visible light active materials
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