

Synthesis, characterization and photocatalytic applications of novel multifunctional mesoporous hybrid nanocomposite catalysts

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Abstract:

Crystal violet, Orange G, Methylene Blue, Rhodamine – B are environmentally harmful dyes, they are highly useful in various dyeing industry. To degrade this dye to harmless product is the specific task of most of the environmental researchers. Use of Environmentally friendly way of degradation by photocatalysis is a right pathway.

There are several photocatalysts were found in literature. However they are having some limitations like less efficiency. It is assumed that the photocatalytic activity can be improved by the preparation of multifunctional hybrid mixture of known catalysts with desired property. Instead of conventional single metal incorporated mesoporous materials, Bi metal incorporated mesoporous materials and Fe_2O_3 or V_2O_5 or MgVO_4 or Ag_3PO_4 or g- C_3N_4 are two different nano materials discovered recently with high surface area and/or photocatalytic active materials. The combination of this two we can get a hybrid material with more activity. With this basic concept we are planning to synthesize novel multifunctional materials and their photocatalytic dye degradation studies. In addition to this catalysis efficiency in Photocatalytic water splitting property will also be studied.

The results are important in terms of renewable energy and Green chemistry. Sol-gel method, co-precipitation, hydrothermal method and impregnation methods will be used in the preparation of the catalyst. To characterize the materials XRD, SEM-EDAX, TG/DTA, BET, FT-IR, Raman, ESR, UV-Vis., XPS, MASNMR, Cyclic Voltammetry, GC and GC-MS techniques will be used for characterization of the synthesized Inorganic materials and analysis of various dye degradation products.

Key Words: photocatalyst, Mesoporous material, Environment, Dye degradation, Pesticide degradation and Nano-Composite.