Cadmium sulphide based semiconducting Nanocomposites for visible light photo catalytic application

Objective:

- To synthesize CdS based semiconducting nanocomposites
- To analyse their photo catalytic properties
- To improve the performance of photocatalyst by doping

Signification of work:

Cadmium sulphide is an important group of II-VI semiconducting nanomaterial with excellent physical properties and wide band gap energy, are successful in the utilization of photo catalytic application. Photocatalytic technology is one of important technology to solve environmental and energy issues. In recent years, the visible light induced photo degradation of dyes using nanoparticles is drawing more research interest to make the process more effective, green, and economical. Most of these researches are focused on enhancing the photo catalytic efficiency, by using different doped nanoparticles. In general, for the degradation of the organic dyes, the utilization of electron-hole pairs are playing an important role, on the other hand, the photo catalytic activity is suppressed due to the Recombination of electron-hole pair. The best path to enhance the photo catalytic activity is by doping the CdS semiconductor with the transition metals, having magnetic property, such as Fe, Co and Ni. Because, when doping the magnetic transition metal ion like nickel to the host lattice, new defect locations are generated that act as an electron bond and restrains the photo generated hole-electrons pair recombination. In consequence, created electrons and holes are shifted towards catalyst surface where they contribute to degrading process with the organic pigment.

Cadmium sulphide, a visible-light-responsive photo catalyst with a band gap of 2.4 eV, is one of the most prominent semiconductor photo catalysts among the various sulphides for photo catalytic H_2 production. Various sulphides for photo catalytic H_2 production. CdS has been the subject of much research in the field of photo catalytic H_2 production. On the one hand, CdS has good performance for visible light absorption at wavelengths Shorter than 516 nm. On the other hand, it has a good carrier transportation capacity, which can make photo generated electrons and holes mobile in a timely and efficient manner, Extending the life of the photo generated carriers and leading to high photo catalytic activity. CdS photo catalysts have been of great significance for environmental and energy applications over the past few years. CdS-based compositions need to be further developed. On the other hand, a simple and facile

synthetic method with low cost and high safety may provide a new direction to expand the areas of application of photo catalysts. There are some other factors that influence the performance of CdS and CdS-based photo catalysts during the photo catalytic process, such as the morphology, shape, crystal size and so on. Therefore, for further studies a better understanding of the reactive mechanism and theories are necessary and should be given more attention, since this has vital significance for designing and controlling CdS photo catalysts with excellent photo catalytic properties.

Methodology:

Chemical precipaitation method will be adopted for the synthesis of CdS based semiconducting nanocomposites.

Scope:

In the future, more attention should be directed toward investigating the relationships between structures, functions, and the mechanism of photo catalytic reactions based on the CdS and CdSe-based photo catalysts. Furthermore, it is expected that CdS and CdSe-based photocatalysts will be the promotion of the solar-fuel applications and environmental protection.

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