ORAL presentation

Green nanotechnology for effective dye-degradation of industrial effluents

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We are currently confronted with challenges due to energy crisis, scarcity of pure drinking water and life threatening drug resistant bacteria in conjunction with global warming. Like other resources, water resource also requires ardent protection due to its scarcity and continuous pollution. With the rapid industrialization different contaminations are released into water bodies. Dyes are released in aqueous streams as effluents of several industries, including textiles, paper, leather, plastic, automotive, furniture, finishing sector, and others, which consequently create intense environmental degradation via the release of potential carcinogenic and toxic substances into the aqueous phase. Generally, dyes are complex unsaturated aromatic compounds with accompanied characteristics of its color, intensity, solubility, fastness, and substansiveness. To mitigate these challenges, the quest for functional green nanaomaterial based photocatalysts has raised enormous enthusiasm among the researchers. These catalysts are capable of generating reactive oxygen species (ROS) with the help of renewable energy source especially the sunlight. In this context, functional nano-ceramic materials are promising for photocatalytic applications where photon energy from sunlight can be utilized for degradation of organic dyes present in industrial effluent. In our recent work, $BiVO_4$ nanoparticles have been synthesized in both pristine and doped form via hydrothermal synthesis method. Structural characterization performed by XRD analysis confirmed the presence of pure monoclinic $BiVO_4$ phase. FESEM and TEM images revealed a mixed heterostructure consisting of spherical and rod shaped nanoparticles having a particle size of approximately 120 nm. Optical band-gap of the synthesized nanoparticles was measured to be 2 eV. The synthesized nanoparticles will be explored as very promising photocatalytic materials with an enhanced degradation capacity after doping with transition metals (Fe, Cu and Mn). The effect of pH, morphology, structure and band-gap of the nanoparticles on photocatalytic performance will also be highlighted.