Noble materials and Bi nanoparticles-decorated ZnO structure with enhanced optical properties for the application in optoelectronic devices

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Zinc oxide (ZnO), a promising II–VI group semiconductor material, has been widely applied in various fields such as transducers, transparent conduction electrodes, solar cells, and wide ultraviolet (UV) opto electronic devices due to its direct band gap of 3.37 eV at room temperature and a large exciton binding energy of 60 meV1 . ZnO is also inexpensive, abundant in the nature, chemically stable and non toxic. Doping with appropriate elements in ZnO has been reported to be an excellent way to improve its properties to avail this material for various luminescence device fabrications. Near band edge emission in photoluminescence spectrum of Bi-ZnO nano wires is red-shifted relative to that of undoped ZnO nano rods as a result of enhanced carrier concentration. Bi has been used as a visible light-driven semiconductor photocatalyst and has attracted attention for organic photocatalytic degradation. The modification of semiconductors with noble metals has also attracted significant attention, especially in studies related to heterogeneous photocatalysis. Figure 1 shows the synthesis of Ag-Bi codoped ZnO nanostructure. The applications of Bi doped ZnO as photocatalyst is shown in figure 2.

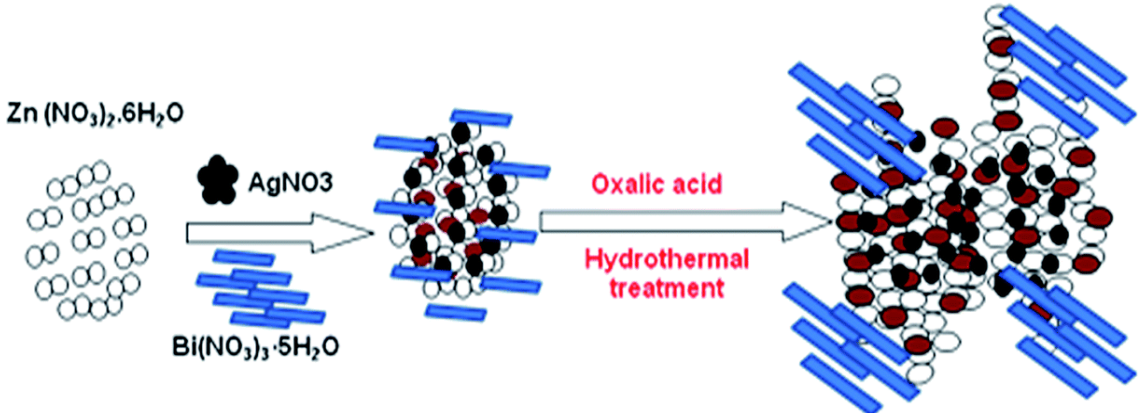

Figure 1. Synthesis of Ag-Bi codoped ZnO nanostructure

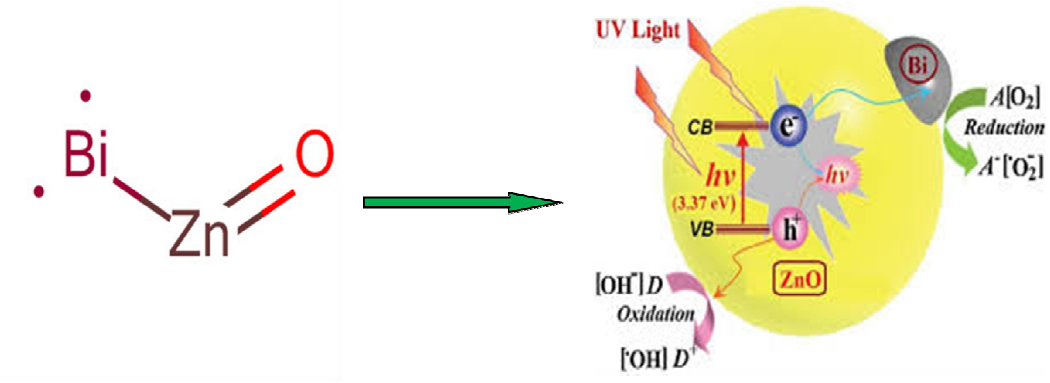

Figure 2. Application of Bi doped ZnO as a photocatalyst