

Main Conclusion

- We have successfully synthesized transition metal ions such as Ni^{2+} , Fe , Mn^{2+} , Co^{2+} , Cu^{2+} doped II-VI semiconductor nanoparticles. We have used different ligands like 2-mercaptoethanol, tartaric acid, sodium dodecylsulphate (SDS), cetyltrimethylammonium bromide (CTAB), sodium bis(2-ethylhexyl)sulfosuccinate (AOT), polyethylene glycol (PEG) as capping agent to control the size and shape of the nanoparticles.
- We have studied the effect of concentration of dopant ions on the morphologies of the ZnS and ZnO nanoparticles. We have observed various morphologies such as tripods, nanorods, nanosheets, long-arm multipods of ZnS: Ni^{2+} nanoparticles by increasing the concentration of Ni^{2+} during synthesis.
- We have studied the effect of concentration of dopant ions on magnetic properties of the material. ZnS:Fe nanoparticles showed increase in the magnetic property with increase in the dopant ion (Fe) in the host material. We have also studied the magnetic properties of the undoped material.
- The as-synthesized material may find application as a photocatalyst in the dye (rodamine B) degradation. We have also studied the mechanism of the photocatalysis.
- We have observed that the morphology of ZnO nanoparticles can be tuned by changing the synthetic parameters such as concentration of capping agent, presence of additives etc.

- We have studied the surface charge stabilization of the nanoparticles using zeta potential. It was observed that different precursor anions play an important role in the surface charge stabilization of the nanoparticles.
- We have studied the effect of pH of the reaction medium on the photoluminescence emission property of ZnS. The band-edge emission in UV region is dominated in basic medium while in acidic medium due to large number of defects and vacancies, emissions in visible region are dominated.
- We have synthesized ZnS and ZnO nanoparticles using reverse micelles and studied the optical properties. We can tune the particle size of nanoparticles by changing water to surfactant ratio.
- The effect of different transition metal ions (Mn^{+2} , Ni^{+2} , Co^{+2}) on the optical properties of material was also studied. The ZnS: Mn^{2+} /tartaric acid nanoparticles showed highest photoluminescence emission intensity when compared with the Ni^{+2} , Co^{+2} and undoped ZnS nanoparticles.