

## **Abstract**

In present work, CdS QDs and varying concentrations (0.02, 0.04 and 0.06 wt. %) of cellulose nanocrystals grafted polyvinylpyrrolidone (CNC-g-PVP) doped CdS QDs were prepared by coprecipitation route. These synthesized QDs are fruitful in the removal of organic pollutants like methylene blue (MB) from wastewater and for antibacterial agents. The structural, optical and morphological characteristics of prepared products have been studied via various characterization techniques. The XRD study analyzed hexagonal crystal structure of CdS QDs, and upon doping no prominent shift was observed in the spectrum. The UV-vis absorption pattern identified blueshift in absorption upon doping, as a result an increase in band gap energy ( $E_g$ ) was measured. HR-TEM study reveals QDs for pure and doped samples with high aggregation. The pure, dopant and doped QDs were used as catalyst against MB dye that reduced in  $\text{NaBH}_4$  presence and showed remarkable results in basic medium. Prepared (0.06 wt. %) doped QDs as antibacterial agents exhibited significantly large zone area against *E. coli* and *S. aureus* pathogens.