

Enhanced antibacterial activity of surface-modified organosilane-treated ZnO quantum dots synthesized using co-precipitation method

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This study demonstrates the enhanced antibacterial activity of bare ZnO QDs and surface-modified organosilane-treated ZnO QDs synthesized using modified precipitation. The surface of ZnO QDs was modified using 3-(trimethoxysilyl) propyl methacrylate (MPS) as a size-reducing agent. The XRD pattern of the ZnO QDs revealed a hexagonal wurtzite structure. After being treated with organosilane, the crystallite size of ZnO QDs shrank. The UV-DRS spectra exhibited a strong blue shift at 380 nm, confirming that ZnO QDs were successfully modified using MPS. HRTEM analysis revealed that particle size decreased due to its surface modification and reduced agglomeration, which improved antibacterial activity. Results of the analysis of the antibacterial properties revealed that MPS modification was effective and enhanced the antibacterial activity of ZnO QDs. The gram-negative bacteria had better antibacterial performance with larger zones of inhibition for ZnO-MPS QDs than gram-positive bacteria.