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Role of ligands on the photoluminescence of colloidal CdSe quantum dots and enhancement of photoconductivity of ZnO nanowires by quantum dots SYAMANTA KUMAR GOSWAMI, TAE SOO KIM, BYOUNG WOO LEE, EUNSOON OH¹, CH. KIRAN KUMAR, EUI TAE KIM, Chungnam National University, DEPARTMENT OF PHYSICS TEAM, DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING TEAM — Colloidal core-shell CdSe/ZnS quantum dots (QDs) encapsulated by trioctylphosphine oxide ligand were synthesized via pyrolysis. Then the TOPO ligands by 3-mercaptopropionic acid ligands were replaced under Ar environment. ZnO nanowires were fabricated by sonochemical method on pre-patterned alumina electrodes. With increasing temperature above 220 K, the PL lifetime was found to be increased in case of the TOPO capped QDs, whereas for the MPA capped QDs, the lifetime was short and almost independent of temperature. The conductivity of ZnO nanorods was increased after the deposition of the QDs, which was further enhanced by the exposure of light. This increase in the conductivity with and without light can be explained by the photo-carrier transport and surface modification effect, respectively. The photo-generated electrons in the CdSe QDs will tend to move toward the ZnO nanowires, resulting in the enhancement of photo-conductivity in the ZnO nanowires.

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