

Low voltage, hysteresis free and high mobility transistors from all-inorganic colloidal nanocrystals

정대성*
동아대학교
(dchung@dau.ac.kr*)

High mobility solution processed all-inorganic solid state nanocrystal (NC) transistors with low operation voltage and near-zero hysteresis are demonstrated using high capacitance ZrO_x and hydroxyl-free CytopTM gate dielectric materials. The use of inorganic capping ligands ($In_2Se_4^{2-}$ and S^{2-}) allowed us to achieve high electron mobility in the arrays of solution-processed CdSe nanocrystals. We also studied the hysteresis behavior and switching speed of NC-based field effect devices. Collectively, these analyses helped to understand the charge transport and trapping mechanisms in all-inorganic NCs arrays. Finally, we have examined the rapid thermal annealing as an approach toward high performance solution processed NCs-based devices and demonstrated transistor operation with mobility above $30 \text{ cm}^2/\text{Vs}$ without compromising low operation voltage and hysteresis.