Utilizing a simple and reliable method to investigate the optical functions of small molecular organic films – Alq3 and Gaq3 as examples

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\textbf{ABSTRACT}

This work reports on the optical functions of trio(8-hydroxyquinolinate) gallium and aluminum small molecular organic films grown by utilizing a home-made thermal evaporator and studied with a spectrophotometer. The non-dispersive refractive index of the Gaq3 and Alq3 films was calculated as 1.77 and 1.68, respectively. The higher refractive index of Gaq3 was attributed to the higher molecular packing density of Gaq3 compared to that of Alq3. A larger dielectric constant for Gaq3 was noticed, indicating the presence of a higher density of states and space charge accumulation in the Gaq3 films compared to those of Alq3. We assigned the presence of direct allowed transition to energy gaps of 2.80 eV and 2.86 eV for the Gaq3 and Alq3 films, respectively. These differences are thought to be caused by the effects of central metal cations of Ca\textsuperscript{2+} and Al\textsuperscript{3+} on their molecular quinoline ligands.