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Exploring charge/energy the transfer process at the graphene/giant nanocrystal quantum dots interfaces YONGQIAN GAO, ENKELEDA DERVISHI, NILADRI KARAN, YAGNASENI GHOSH, JENNIFER HOLLINGSWORTH, STEVPHEN DOORN, HAN HTOON, Center for Integrated Nanotechnologies, Materials Physics and Applications Division, Los Alamos National Laboratory — Due to its transparency in wide spectral range and high charge mobilities, graphene has been considered to utilize as transparent electrode for nanocrystal based photo-voltaic and light emitting diodes. A detail understanding on charge/energy transfer (CT/ET) processes between zero dimensional quantum dots and 2D graphene layer hold the key in optimizing the performance of these devices. To attain this understanding, we conduct a systematic study on CT and ET processes between a graphene layer and CdSe/CdS giant nanocrystal quantum dots (g-NQD) as the function of CdS shell thickness. In addition to analyzing PL quenching and change of PL decay dynamic, we also perform 2^{nd} order photon correlation spectroscopy studies to investigate the effect of graphene layer on dynamic and emission efficiency of g-NQDs' multi-exciton states. In case of g-NQDs over coated with a thick 16 ML CdS shell, we observed a surprising increase of multi-exciton emission efficiency.

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