Study of Excitonic Property in Assembled Copper-doped Colloidal CdSe Nanoplatelets

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We demonstrate a synthetic method of copper-doped colloidal CdSe nanoplatelets (Cu-doped NPLs) and excitonic property in assembled Cu-doped NPLs. Instead of conventional synthesis process of Cu-doped zero-dimensional quantum dots, Cu-doped NPLs are successively synthesized by introducing of Cu acetate precursor and control of injection timing. Prepared Cu-doped NPLs reveal dual emission florescent property, which is originated by emissions from 1S exciton state (1S emission) and Cu doped state (Cu emission). The dual emission ratio is tuned by Cu doping concentration. After assembly process, we examine the emission and carrier dynamics properties of Cu doped NPLs film by photoluminescence quantum yield measurement and time resolved photoluminescence spectroscopy. The results show that fast energy transfer of NPLs is responsible for decreased 1S emission, while quantum yield from Cu emission is significantly increased by exciton harvesting during the energy transfer process.