Light Harvesting from II-VI Semiconductor Heteronanostructures

Sameer Sapra

Department of Chemistry, Indian Institute of Technology Delhi, New Delhi 110016, India

sapra@chemistry.iitd.ac.in

http://web.iitd.ac.in/~sapra

Semiconductor nanocrystals have exciting properties due to the possibility of tuning the band gap of these materials by merely changing the size of the particles. This is a result of quantum confinement of the charge carriers in all three dimensions in a small dot of a few nanometers in diameter; also the reason for them to be called quantum dots. The band gap tuning allows us to access various regions of the electromagnetic spectrum from the same material whereas the confinement of charge carriers leads to strong overlap between the electron and the hole wavefunctions resulting in an efficient recombination leading to enhanced fluorescence yields. The tuning of the various fluorescence emissions has enabled us to design light emitting devices much needed for the future of lighting.

The separation of the charge carriers opens yet another area in the field of energy, namely light harvesting applications. The challenge here is to extract the charge carriers quickly away from the nanocrystals before they recombine. Designing heteronanostructures that aid in charge separation seem to be quite promising for such applications that include photocatalysis, photoconductivity and photovoltaics.

Some of these aspects concerning quantum dots will be discussed.

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