

## Non-Water-Soluble Quantum Dots Dissolve in Water

Supporting/Contributing Agency: U.S. EPA

A study released in January 2009 by a research team (Dr. Diana S. Aga, Dr. Sarbajit Banerjee, Divina A. Navarro, and Dr. David F. Watson) from the University at Buffalo showed for the first time that quantum dots (QD), despite having non-water-soluble coating, can transfer from an organic solvent into an aqueous phase in the presence of natural organic matter (Navarro et al. 2009). Furthermore, there is evidence suggesting that the core metals used for QD synthesis (Cd, Se) can leach out during the “dissolution” of the QDs in water. These metals are considered toxic to aquatic organisms even at relatively low levels. Therefore, these findings are critical in the understanding of the fate and transport of QDs in the aquatic and terrestrial systems, and in assessing the potential ecological risks that may be associated with QDs entering the environment. Due to the expected increase in production and commercialization of QDs, along with other inorganic nanoparticles, development of more robust coatings that could help to maintain the structural integrity of QDs is warranted.

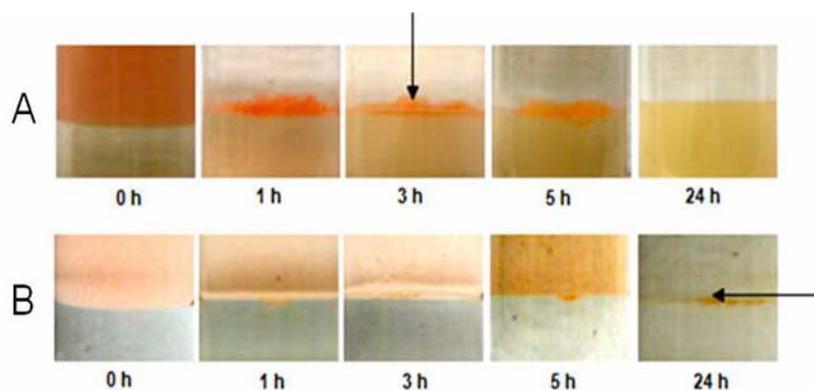


Figure. This figure shows (A) transfer of 3-nm TOPO-capped CdSe in hexane (top layer) to the aqueous phase (bottom layer) containing 20 ppm humic acids in comparison with (B) control set-ups showing no OD transfer to deionized water (bottom layer) without humic acids.

### Reference/Publication

Navarro, D.A.G.; Watson, D. F.; Aga, D.S.; Banerjee, S. Natural Organic Matter-Mediated Phase Transfer of Quantum Dots in the Aquatic Environment. *Environ. Sci. Technol.*, 2009, 43, 677-682.