

DSM Science & Technology Awards (NORTH) 2008	
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Quantum Dots (QDs) are very small nanocrystals with a size of approximately 5 nm (or 1000 atoms). They have a special property: by simply changing their size, QDs can emit light of any desired color in the spectrum. Apart from obtaining new insights into the synthesis and optical properties of these nanoparticles (relevant for solar cell applications), my PhD-research has focused on how to use QDs as contrast agents for bio-imaging. For this purpose, highly robust QDs were synthesized and coated with a layer of paramagnetic lipids, resulting in a contrast agent that is detectable with both MRI and fluorescence imaging. Even more promising is the concept where we incorporated QDs in very small glass nanospheres, and then applied a lipid-coating using a novel procedure. Not only QDs, but also other contrast agents or drugs can be integrated simultaneously in the core or lipid coating of these biocompatible nanospheres. This highly versatile, all-in-one contrast agent allows the imaging of biological processes with complementary techniques like MRI, CT, or fluorescence imaging, as demonstrated in preliminary tests on cells and living animals.