**Nanomaterials for Semi-Transparent Photovoltaics and Transparent Wood**

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We have developed silicon nanocrystal quantum dots1 and noble metal nanocluster2 based luminescent solar concentrator (LSC) devices for semi-transparent photovoltaics. Both types of nanoparticles were optimized through core and ligand engineering to achieve high quantum yield and large Stokes shift necessary for this application. A specific polymer matrix (thiol-ene) was applied to stabilize these inorganic luminescent fluorophores3. An improvement of light conversion efficiency in the polymer shell (quantum yield > 70%) was found in both types of nanoparticles and attributed to the reaction with active thiol radicals4.

The LSC device is configurated as a triplex with a polymer film containing nanoparticles sandwiched between two glass sheets. Such components are intended to be used as glazing units for building-integrated photovoltaics. They feature low-haze (< 5%), high visible light transparency (>50%) and large area (30x30 cm2). Color control can be realized through selective Mie scatterers, where color neutral devices were demonstrated5. Integration with smart windows and other utilization strategies will be discussed6.

As another manifestation of a functional transparent composite, we developed transparent wood with strong mechanical properties and variable haze7. After delignification of the wood scaffold a refractive index matching polymer was filled in the lumen space to create an optically homogeneous material. We studied basic optical properties of this new composite, such as transparency and haze, as well as light propagation mechanism using time-resolved techniques8, 9. Prospects of using this renewable material for glazing and other applications will be reviewed as recent advanced led to the realization of thick (up to 15 mm) components10.

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