

Previous Status Quo

Semiconductor solar cells provide a tiny fraction of the world's electricity needs, partly due to limited efficiency and high material cost. Improved or novel technologies are of key importance to make solar cell a viable source of electricity.

New Insights

A novel solar cell technology based on the LSPR-effect of metal nanoparticles (MNPs) has been patented by the Norwegian company EnSol.

As a part of the optimization process of this all-metal solar cell, the LSPR-effect of large arrays of MNPs must be studied, experimentally and numerically.

Project Details

- Large 9 – 16 mm² arrays of disk-shaped MNPs on a borosilicate glass have been fabricated using EBL and characterized by the means of integrating spheres.
- The GranFilm code, written by I. Simonsen and R.Lazzari, has been used to model the transmittance of truncated spheroidal nanoparticles on a glass substrate.

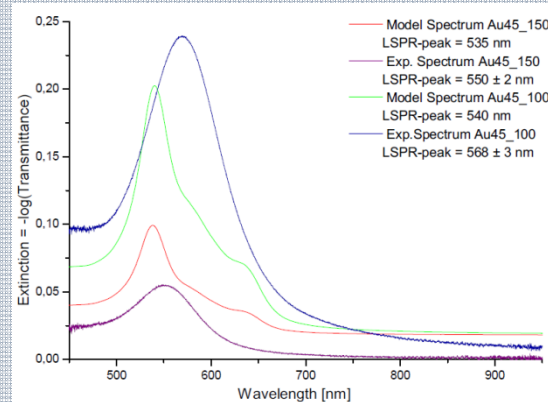


Figure 1: Modelled and experimental extinction spectra. Samples are named according to the constituent metal, the particle diameter and the interparticle spacing.

Challenges

GranFilm is valid in the electrostatic regime, and needs to be extended to adequately describe larger nanoparticles. Experimentally, the effects of changing the metal as well as the MNP shape are currently being analyzed.

Next Steps

GranFilm will be used to optimize MNP absorption for the fabrication of model solar cells.

