Manipulating Matter with Light

Dr. Udo Bach (Associate Professor)

udo.bach@monash.edu, Building 27 Room 215, 990 56 264

http://www.chem.monash.edu.au/staff/bach/

It has recently been shown that the growth of nanoparticles can be directed by light. Figure 1 shows how silver nanodiscs reversibly transform to nanoprisms under visible light illumination [1]. The wavelength-dependent formation of regular dodecahedras, platelets as well as nanorods has also been reported recently [2]. The ability to direct the chemical synthesis of metal nanoparticles simply by controlled irradiation offers exciting opportunities for the fabrication of novel functional materials.

Aim of the project:

This project will focus on studying the wavelength and photon-flux dependence of photomorphic conversion processes of silver nanoparticles in solution as well as on solid supports. Aim of this project will be to translate the impressive level of shape control of colloidal nanoparticles to surface-immobilized nanostructures (regular nanoparticle assemblies). This work will be undertaken in collaboration with the Melbourne Centre for Nanofabrication. For further questions please contact Udo (see above).

Emphasis: Experimental 100%

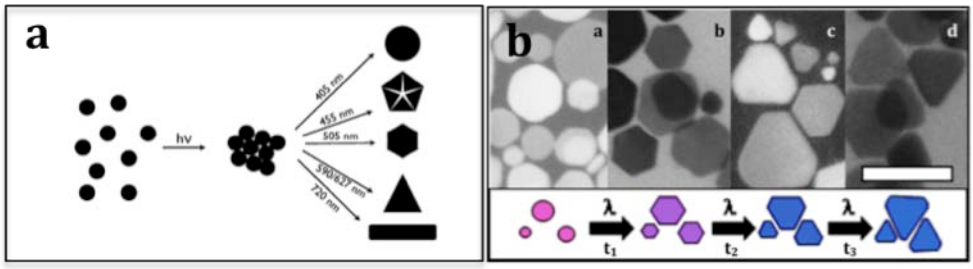

Figure 1. Photomorphism. a. Schematic diagram of photomorphic synthesis according to reference [2]. b. Transmitted electron microscopy images of particles from a solution that was light excited for 0, 2, 8 and 16 minutes. The scale bar is equal to 100 nm. Taken from G. Lee et al., ref. [1]

Literature:

[1] *A new twist: controlled shape-shifting of silver nanoparticles from prisms to discs;* George P. Lee, Andrew I. Minett, Peter C. Innis and Gordon Wallace *J. Mater. Chem*., 2009, 19, 8294- 8298, DOI: 10.1039/b913811K

[2] Light Emitting Diode Irradiation Can Control the Morphology and Optical Properties of Silver Nanoparticles, Kevin G. Stamplecoskie and Juan C. Scaiano, *J. Am. Chem Soc*. 2010, 132, 1825