In this project we will fabricate metal and semiconductor nanoparticles by laser ablation of solid targets immersed in a liquid solvent using ultrafast laser pulses. Because the nanoparticles are created directly from a solid target there is no need for any of the toxic chemicals usually needed for chemical synthesis of nanoparticles. Therefore synthesis of nanoparticles by laser ablation is considered a very promising and “green” technology compared with conventional chemical synthesis.

Initially, we will focus on the fabrication of ZnO nanoparticles by laser ablation of a Zinc target in water. The resultant solutions of ZnO nanoparticles in water will be analyzed by absorption spectroscopy, which will allow their average size to be determined using a simple quantum mechanical model. Their actual size distribution will then be measured by Nanosight.

Afterwards we will move on to fabricate metallic nanoparticles from e.g. Copper or gold. Their average size can be determined from their localized surface plasmon resonance energy, which can be measured by absorption spectroscopy and compared with theory. Like with the ZnO nanoparticles their actual size distribution will then be measured by Nanosight.

References: