

## Temperature-dependent energy-transfer in colloidal dispersions

Kristina G. Wagner<sup>1</sup>, and Matthias Karg<sup>1</sup>

<sup>1</sup> *Physical Chemistry I, Heinrich-Heine-University Duesseldorf, Duesseldorf, Germany*

Organic dye molecules are well-known to show fluorescence making them useful for many applications in fields like sensing, spectroscopy and imaging. For many of these applications it would be beneficial if the fluorescence intensity can be controlled in a reversible manner. This can be achieved by reversibly changing the chemical or physical environment of the dye.

We decorated gold nanoparticles with  $\alpha$ -trithiocarbonate- $\omega$ -dye-terminated poly(N-isopropylacrylamide) (PNIPAM) chains. This was performed by ligand exchange making use of the high affinity of the trithiocarbonate group to the gold surface [1]. PNIPAM shows a thermoresponsive behaviour with a lower critical solution temperature (LCST) of approximately 32°C in water.

This inorganic/organic hybrid system allows to reversibly regulate the distance between the plasmonic nanoparticle and the terminal dye molecules due to the collapse of the polymer linker above the LCST. This distance control has a strong influence on the dye emission because of non-radiative energy-transfer between the excited dyes and the gold nanoparticles [2]. Hence our inorganic/organic hybrid system allows fine adjustment of the fluorescence intensity by temperature.

In this contribution we discuss the optical properties of plasmonic nanoparticles decorated with dye-labelled polymers focussing on steady-state fluorescence as well as lifetime measurements to characterize the emission behavior.

[1] T.Honold *et al.*, *Langmuir*, 2017, **33**, 253.

[2] P.Reineck *et al.*, *ACS Nano*, 2013, **7**, 6636.

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