

Complex Photonic Systems (COPS)

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In common terms the Chair of Complex Photonic Systems (COPS) aims to literally "bully" light. We investigate how light can be trapped, scattered and unscattered, emitted faster or slower, or ultrafast switched. That's why we manufacture new photonic materials, we do advanced optical experiments, we develop theory to understand our observations and we apply our know-how in collaboration with leading industry (such as Addoptics, Anteryon, ASML, Demcon, JMO, Lumileds, Signify and TNO.). Here we present a number of chemistry related projects currently offered at COPS.

1) Surface chemistry of polymers for positioning of quantum dots in photonic media

It appears that the emission of light by a molecule or a quantum dot depends strongly on its position within a photonic structure. Previously we have worked with polymer brushes to place the quantum dots exactly where we want. Whilst effective, the polymer brushes are very difficult chemistry, costly in time and resources. Can we use charged polymers, such as poly-L-lysine, to build scaffolds for quantum dot attachment?



2) Spectroscopy of quantum dots and phosphors

Our collection of quantum dots is raising some questions. How does the solvent affect the emission? How does the shell and chemistry affect the emission? Performing a range of emission experiments on a custom-built setup, we hope to shed light on the mysteries of quantum dot emission.



3) Coating using colloidal suspensions of polymer beads

We are interested in how light interacts with polymer beads, be they randomly arranged or neatly ordered. How does deposition method change the ordering of polymer beads? Using a range of methods, such as dip-coating, spray painting, inkjet printing or whatever else can be dreamed up, we want to control the deposition of polymer beads to vary the thickness and the order.

