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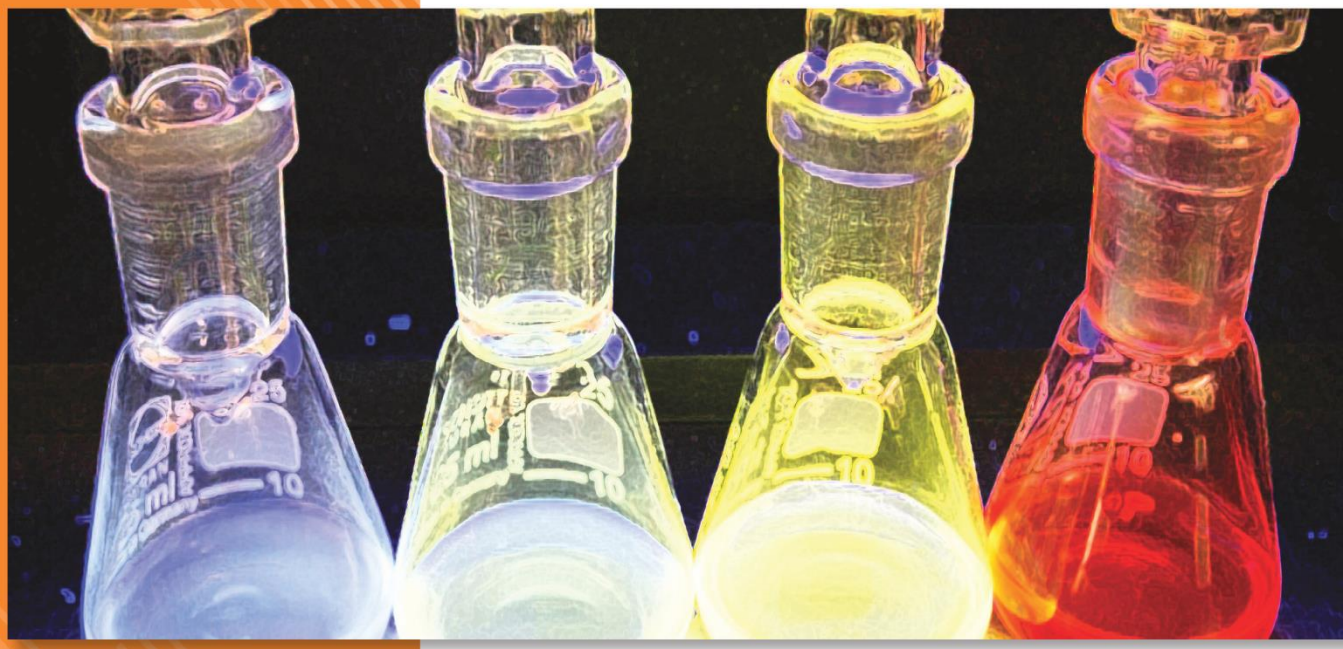

Particle-Based Inks for Electronics

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Traditional liquid precursors for metals, semiconductors, and oxides typically contain soluble molecules that react during deposition to form hard films in situ. Colloidal particles that form stable, homogeneous dispersions are an interesting alternative. My group prepares small particles that are transparent, fit even through the nozzles of printers, and form flat films. Using such particles for electronics is not straightforward, however: particle-particle interfaces and insulating ligand layers limit the performance of particle layers.

I will present strategies to overcome such limitations. We created hybrid metal nanoparticles carry a shell of a conductive polymer. The polymer doubles as a stabilizing layer that guarantees a long-lived dispersion and as a soft link between the hard metal cores. Hybrid particle inks form conductive films without sintering [Reiser et al., RSC Chemical Science, 2016, doi 10.1039/C6SC00142D].

Ultrathin nanowires are highly anisotropic colloidal objects that form in wet-chemical syntheses. We use such wires as highly flexible building parts and exploit their tendency to bundle to convert them into thicker, conductive wires. Nanoimprint lets us create wire-based, conductive meshes with defined geometries.

Finally, I will discuss possible applications of interacting particles in tomorrow's electronic materials: Additive manufacturing with structural control, dynamic reconfiguration in "active nanocomposites", and heterogeneous particle superstructures.

25. April 2016
16:00 Uhr
Campus Freudenberg
Hörsaal FZH3

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