

Highly endowed grant for two NIM members



The NIM members Professor Alexander Högele and Professor Tim Liedl are both awarded with a Starting Grant of the European Research Council (ERC). The grant supports excellent researchers and their forward looking basic research with up to two million Euro.

Tim Liedl's Project

If you have ever tried to catch a fish in a clear stream, you will have noticed that the fish was never where it appeared to be. This is because light rays are bent or refracted at the interface between two media such as air and water. All naturally occurring materials show a positive refractive index – the incident and refracted rays lie on opposite sides of the normal to the interface. But materials scientists have recently synthesized artificial structures, so-called “metamaterials”, which exhibit a negative refractive index. Here, incident and refracted rays lie on the same side of the normal. Such metamaterials consist of ordered arrays whose elements have dimensions of less than 100 nanometers.

Tim Liedl and his team specialize in the art of DNA origami – the use of DNA strands with defined nucleotide sequences for the self-assembly of predetermined three-dimensional structures. The LMU researchers recently succeeded in attaching gold nanoparticles to defined positions on these scaffolds, and showed that the resulting structures were capable of altering the polarization of light. Thus, Liedl and his group demonstrated that DNA origami and metallic nanoparticles can in principle be used to build structures that alter optical parameters in particular ways.

The next step is to use this type of nanostructure as the basis for the synthesis of a metamaterial with a negative refractive index. Such a material could be used, together with existing positive-index materials, to achieve fundamental improvements in the performance of optical systems such as microscopes, solar cells and wave guides. The researchers are also interested in exploring whether optically active metamaterials might serve as highly sensitive virus sensors or as specific cell markers.

Tim Liedl studied Physics at LMU Munich and did his doctoral research in Friedrich C. Simmel's research group. From 2007 until 2009 he worked as a postdoc with William M. Shih in the Dana-Farber Cancer Institute at Harvard Medical School in Boston, USA. In 2009 Liedl was appointed Professor of Experimental Physics at LMU Munich.

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