**Abstract:** DNA has proven to be an excellent choice of molecule for programmable self-assembly. In recent years, DNA self-assembly has surpassed its early stages and today is routinely used for constructing functional two- and three-dimensional nanomachines and materials [1,2].

By defining attachment sites for active components on DNA structures, our group has realised complex and nanometer-precise assemblies of biomolecules, organic fluorophores and inorganic nanoparticles [3]. We employed these devices as autonomous force spectrometers [4] and to create new plasmonic effects. These effects, in turn, enable the selective and sensitive detection of proteins and RNA molecules [5].

The initial thrust catalyzing the rapid development of DNA nanotechnology has been to arrange periodic DNA frameworks to host guest molecules for crystal structure analysis. Despite enormous efforts and fundamental progress, placing guest molecules in designed DNA crystals remains a challenging goal. By adopting design principles of Ned Seeman and Chengde Mao [6], we are now able to crystallise DNA origami structures that grow into three-dimensional, micrometer-scale assemblies [7]. Silicification of these crystals leads to designer nanomaterials that withstand drying without structural deformation [8].

Our recent results demonstrate the assembly power of DNA into diamond-type lattices and our ability to fabricate functional devices and 3D materials that are designed on the molecular level while reaching macroscopic dimensions.

**References**


**Biographical Sketch:** Tim Liedl is Professor for experimental physics at the Ludwig-Maximilians-Universität since 2009. He received his diploma in physics in 2004 in the group of Wolfgang J. Parak at Ludwig-Maximilians-University Munich (LMU) where he worked on the development of hydrophilic coatings for fluorescent semiconductor nanoparticles. In 2007 he obtained his Ph.D. in the group of Friedrich C. Simmel studying DNA-based nanodevices and switches which are driven by chemical oscillations. From spring 2007 till summer 2009 he visited William M. Shih’s laboratory at Dana-Farber Cancer Institute / Harvard Medical School where he used the DNA-origami method to construct self-assembling two- and three-dimensional structures. The research of Tim Liedl is multi-disciplinary and exploratory positioned at the interface between nanoscience, synthetic biology and cell-biology. Its current focus lies on the application of DNA-based nanostructures as self-assembled functional materials.