Prof. Peer Fischer

Title:
"Nanofabrication for nanorobot propulsion in biofluids"

Abstract:

'Nanorobots' that can navigate the human body have been a dream of the biomedical community for some time. One challenge is simply the locomotion at small scales, where structures have to overcome the viscous and elastic environment. For this purpose we have realized the world's smallest magnetic nanopropellers that, driven by an external field, are able to drill through fluids as well as the complex rheology of biomedically relevant tissues and gels. Our 3D nanofabrication scheme allows wafer-scale production of these nanopropellers and further processing steps can be used to improve the stability of magnetic nanoparticles in solution. The same fabrication method can be used to make an array of (magnetic) nanostructures with potential applications in sensing and targeted drug delivery. The complex environment of biomedically relevant fluids, gels and tissue can also be exploited for novel propulsion schemes at small Reynolds number. In particular, chemical and enzymatic means as well as reciprocal shape changes can be used to swim at the smallest of length scales.