

The Department of Materials Engineering of the TUM School of Engineering and Design cordially invites you to join us for the guest seminar on

Nanotechnology meets bioengineering

October 24, 2025, 10:30 a.m.

Building "IGSSE – Exzellenzzentrum Garching", Room 5530.EG.003
Boltzmannstr. 17, 85748 Garching

Pawel Sikorski. Department of Physics, Norwegian University of Science and Technology, NTNU, Trondheim, Norway. pawel.sikorski@ntnu.no

Prof. Sikorski will highlight the connections between biophysics, bioengineering, biomaterials, and nanotechnology, demonstrating how an integrated approach combining these disciplines can be employed to study living in vitro model systems. Nanotechnology has significant potential to advance biomedical research by providing novel tools and experimental methodologies. Compared to traditional approaches, these techniques often enable miniaturization and enhanced control of experimental systems. I will illustrate how nanostructured substrates can be utilized to induce controlled mechanical deformation of the cell membrane and nucleus, facilitating the study of the relationship between deformation, gene expression, and cellular function.



Transparent substrates compatible with high-resolution optical microscopy and standard biomedical research workflows are a crucial element of our methodology. High-throughput fabrication, allowing the production of numerous samples each with an area of $\sim 1 \text{ cm}^2$, is necessary to obtain statistically significant insights into the biological systems under investigation and to enable complementary analytical methods. Our substrates are fabricated using electron beam lithography on the highly sensitive polymer resist SU-8. Additionally, I will describe how a comparable approach can be applied to investigate the electrophysiology of neural networks on three-dimensional-like substrates.

Pawel Sikorski is full Professor at the Department of Physics, Norwegian University of Science and Technology (NTNU), where he is a member of the Biophysics and Medical Technology research section. His expertise lies in the fields of biomaterials, biophysics, nanoscale material characterization, and nanofabrication. In his research he uses nano- and microfabrication to create artificial cell culture substrates that are, for example, used to study cell-substrate interactions or control the structure of the engineered neuronal network. He is interested in developing new hydrogel-based materials and studying their properties. His group has also pioneered a new technique to form alginate hydrogels compatible with various applications, such as 3D printing, microfluidic-based cell encapsulation, injectable preparations, and large-scale moldable gels. Sikorski received his Master's degree in Materials Engineering from the Faculty of Fundamental Problems of Technology, Wroclaw University of Science and Technology, and his Ph.D. in physics from the University of Bristol, UK. After completing his doctoral studies, he worked at the University of Bristol and NTNU before establishing his research group at NTNU in 2005. He has held visiting scholar positions at the Department of Biomedical Engineering at the University of California, Davis, USA. Further, he leads the Biophysics and Medical Physics Section of the Norwegian Physics Society and a national network that supports the Norwegian nanotechnology Ph.D. education.

Refreshments and lunch will be provided.

Please register: <https://portal.mytum.de/votings/qQkSqobdXLdvFcVlleLLhdhj>