Dear reader, dear TUM friends and associates,

Scientific progress knows no boundaries – and it speaks English, even here in Germany and at our university. As English is the lingua franca of science, "Faszination Forschung" will be published only English from now on. We will not be translating the articles into German so we have even more space to bring you hot-off-the-press news from the world of research.

"Faszination Forschung" is read around the world, not least by our ever-swelling alumni ranks, many of whom return home after their stay at TUM to take up leading positions in their own countries. They are our most effective ambassadors because they live and share the standards of excellence they have learned at TUM. Similarly, "Faszination Forschung" sends a powerful signal about TUM, showcasing and communicating the most fascinating developments at our university.

In this issue we look at the work of Jonathan Finley of the Walter Schottky Institute. This physicist has succeeded in building the world's first nanolasers capable of emitting light at wavelengths that could be useful across a variety of industrial and medical applications. Such nanophotonic technologies could be the key to optical information processing on silicon chips, thus paving the way for the optical computers of the future. Computer miniaturization is also driving a more networked world – referred to as the Internet of Things. This is also the subject of the German government's Industry 4.0 project. Informatics expert Manfred Broy develops theories for the formal modeling of networked cyber-physical systems, which he uses to design these complex architectures.

Nanoscale structures are being created in the laboratory of TUM professor Cordt Zollfrank at the Straubing Competence Center for Renewable Resources. The TUM researcher received the Reinhart Koselleck prize from the German Research Foundation (DFG) for his ground-breaking project. It involves guiding algae with light so that they form delicate micro-structures which then act as templates for functional ceramics. Christian Große uses a variety of methods to find hidden defects in materials, components and structures. The non-destructive testing expert uses every tool in the physics toolbox to develop new measurement techniques for materials like the latest carbon fiber reinforced plastics. The aim of his research is to develop highly reproducible industrial quality control processes.

High-performance batteries will be a key building block in the renewable energy and electromobility landscape of the future. With the help of neutron beams at the Heinz Maier-Leibnitz neutron source research reactor (FRM II), Anatoliy Senyshyn studies the charge and discharge cycles in electrochemical electricity storage systems. He has discovered previously unknown mechanisms that open up new avenues for optimized battery concepts.

Karl-Ludwig Laugwitz and Alessandra Moretti are carrying out ground-breaking research on cardiac muscle cells using stem cells. Using a technique that won the 2012 Nobel Prize in Medicine, the TUM researchers grow cardiac muscle cells from the stem cells of patients with congenital heart conditions. By studying these cells, they have decoded the biomolecular mechanisms that cause these diseases. As a result of their work, new therapies are being developed and tested.

Yet again, "Faszination Forschung" is packed full of research excellence – giving you exciting new insights into life at TUM. Enjoy!

Prof. Wolfgang A. Herrmann

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