

Kerstin G. Blank

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TU Wien, Institut für Angewandte Physik, E134
1040 Wien, Wiedner Hauptstraße 8-10
Yellow Tower „B“, 5th floor, SEM.R. DB gelb 05 B



The seminar will be also held as a Zoom Meeting

<https://tuwien.zoom.us/j/63680510263?pwd=cDZNRG1yRjcwYlltYzJxcitVYkcydz09>

Mechanoresponsive Proteins from molecular mechanisms towards applications in biology and materials science

Proteins are essential building blocks of biogenic materials. In addition to purely protein-based materials, a wide range of different composite materials are formed in Nature, where proteins mediate specific interactions with other biopolymers or mineral surfaces. Using single-molecule force spectroscopy, our key goal is to establish the fundamental sequence-structure-MECHANICS relationships of such interactions and to utilize these for the bottom-up assembly of mechanoresponsive bioinspired materials. In this talk, two examples of protein building blocks will be highlighted. The first example introduces coiled coils, which are highly abundant structural motifs in mammalian tissues. Using synthetic coiled coils, we have unravelled key factors that determine the stability of these structures against shear forces. We then utilized this knowledge to establish a library of mechanically calibrated coiled coils, which are now further developed as mechanosensors for cell biology applications and as mechanoresponsive hydrogel crosslinks. The second example shows bacteria-derived proteins that control the formation of nanometre-sized magnetite crystals. Here, single-molecule force spectroscopy serves as an excellent tool to probe the kinetics and the crystal face specificity of the protein-magnetite interaction. Even though these proteins do not experience force in nature, engineered variants with controlled binding strength can potentially serve as powerful building blocks for controlling the properties of magnetic particle-reinforced composites.

Prof. Dr. Kerstin G. Blank obtained her PhD in Biophysics from Ludwig-Maximilians Universität in Munich in 2006. After two short postdoctoral stays at the universities in Strasbourg and Leuven, she became assistant professor at Radboud University in Nijmegen in 2009. She then moved to the Max Planck Institute of Colloids and Interfaces as a group leader in 'Mechano(bio)chemistry'. Since October 2021, she is full professor at Johannes Kepler University in Linz where she heads the Department of Biomolecular & Selforganizing Matter. Dr. Blank is co-founder, vice chair (2022) and chair (2024) of the Gordon Research Conference on Multiscale Mechanochemistry & Mechanobiology. Since 2022, she is deputy speaker of the Biophysics section of the German Physical Society. She further serves as editorial/advisory board for the journals Supramolecular Materials, SN Applied Sciences, Scientific Reports, Polymer Chemistry, Frontiers in Molecular Biosciences and PLOS ONE.

All interested colleagues are welcome to this seminar lecture
(45 min. presentation followed by discussion).

Friedrich Aumayr
(LVA-Leiter)

Markus Valtiner
(Seminar Chair)