

Philipp J. Thurner

TU Wien, Institute of Lightweight Design and Structural Biomechanics (ILSB)



Tuesday, 10th March 2020, 16:00 s.t.

TU Wien, Institut für Angewandte Physik, E134
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Yellow Tower „B“, 5th floor, SEM.R. DB gelb 05 B



Nano- and Micromechanics of collagen & collagen-rich tissues

Tissues that provide passive mechanical function are generally rich in collagen and it is thought that collagens provide such tissues with stiffness and toughness. Macroscopically, relationships between tissue-structure, composition and mechanical function have been explored but comparatively little has been done in this context on the micro- and nanometer length scale. Yet, perhaps the most important basic structural building block of collagen-rich tissues can be found at these scales: the collagen fibril. Fibrils are rope-like with diameters in the range of tens to hundreds of nanometers and they have extremely high aspect ratios with lengths reaching up to tens of millimeters.

Mechanical properties at these levels is accessible due to continuous development of approaches based on atomic force microscopy or MEMS devices. Insights into tissue mechanics at these levels are not only interesting from a basic science perspective, but also important for understanding changes due to age and disease. That is, they may offer targets for diagnostics and treatment of pathologies. Furthermore, micro- and nanomechanics can be useful to elucidate mechanobiological effects as cells sense their environment at this level.

Philipp Thurner is a professor of biomechanics and head of the ILSB at TU Wien, Austria. He holds an MSc in Physics (TU Graz, Austria) and a PhD in Materials Science and Biomedical Engineering (ETH Zürich). He conducted his postdoctoral training at UC Santa Barbara and UC San Francisco. Prior to his current appointment he was Assistant, Associate and Full Professor at the University of Southampton. At TU Wien, he was as dean of academic affairs for the MSc Program in Biomedical Engineering (2014-2019) and is a board member of the Vienna Center for Engineering in Medicine (ViCEM).

His research interests are mechanics of biological tissues and tissue components. In particular, his group is pursuing investigations into micro- and nanomechanical behavior of bone, tendon, the airway wall and other tissues. Specific focal points have been the role of noncollagenous proteins for bone mechanics and more recently the chemo-mechanics of collagen at the micro- and nanoscale.

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

Friedrich Aumayr
(LVA-Leiter)

Markus Valtiner
(Seminar Chair)