

Seminar über Biomedizinische Photonik (Mid-term evaluation)

Referent/in: *Anjani K. Maurya, EMPA*

Titel: Multiscale Structural decoding of nanofiberous materials for biomedical applications

Electrospinning has been developed as a technique to produce nano- to micron-sized fibers for filtration and biomedical applications.^{1, 2} It is well understood that the internal structure of these fibers highly depends on the polymer type, the spinning solution properties and the spinning parameters. In this study, I present our recent advances in structural insights into electrospun poly(vinylidene fluoride-co-hexafluoropropylene), PVDF/hfp, based nanofiber membranes for non-aligned and aligned (by using a high speed rotating drum) samples using X-ray scattering and diffraction techniques.³ The densely packed lamellar structures in nanoscale with respect to fiber orientation axis have been analyzed by small angle X-ray scattering (SAXS) while the molecular arrangement in the orthorhombic structure is visualized by wide angle X-ray diffraction (WAXD). The nanofibrillar surface structure has also been investigated by AFM performed on single fibers.

Furthermore, based on the theoretical and experimental knowledge gained from the structural analysis of electrospun nanofibers, I discuss the nanoscale structure of a mineralized tendon extracted from turkey leg where the respective orientations and sizes of different phases such as collagen and hydroxyapatite were determined. These studies and my further investigations will provide further insights for personalized diagnoses and treatments as well as ideas for future bio-inspired implants for patients with bone diseases.⁴

1. J. X. Ding, J. Zhang, J. N. Li, D. Li, C. S. Xiao, H. H. Xiao, H. H. Yang, X. L. Zhuang and X. S. Chen, *Prog. Polym. Sci.*, 2019, **90**, 1-34.
2. A. G. Guex, L. Weidenbacher, K. Maniura-Weber, R. M. Rossi and G. Fortunato, *Macromol. Mater. Eng.*, 2017, **302**, 8.
3. A. K. Maurya, L. Weidenbacher, F. Spano, G. Fortunato, R. M. Rossi, M. Frenz, A. Dommann, A. Neels and A. Sadeghpour, *Nanoscale*, 2019, **11**, 7176-7187.
4. A. Groetsch, A. Gourrier, J. Schwiedrzik, M. Sztucki, R. J. Beck, J. D. Shephard, J. Michler, P. K. Zysset and U. Wolfram, *Acta Biomaterialia*, 2019, **89**, 313-329.

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