chem2Dmat
September 03-06, 2019 ● Dresden, Germany
European Conference on Chemistry of Two-Dimensional Materials

Rational Synthesis of Two-Dimensional Conducting Polymer Crystals

Tao Zhang[1], Haoyuan Qi[2], Zhongquan Liao[3], Ehrenfried Zschech[3], Ute Kaiser[2], Xinliang Feng[1]

[1]Faculty of Chemistry and Food Chemistry, Technische Universität Dresden, 01062 Dresden, Germany.

[2]Central Facility of Electron Microscopy, Electron Microscopy Group of Materials Science, Universität Ulm, 89081 Ulm, Germany.

[3]Fraunhofer Institute for Ceramic Technologies and Systems (IKTS), Maria-Reiche-Strasse 2, 01109 Dresden, Germany.

tao.zhang@tu-dresden.de

Abstract

The discovery of linear conducting polymers made of organic monomers has led to unprecedented excitement over their potential applications in organic electronics. It is well known that structural disorder hinders efficient charge transport in conducting polymer films, thus degrading device performance [1]. To achieve long-range charge transport, one intriguing strategy is to align the linear conducting polymer chains into two-dimensional (2D) thin films [2]. The 2D thin film, with high-degree of molecular ordering (i.e. fully expanded-coil conformation) via supramolecular assembly by interchain interactions, can provide multiple pathways for interchain charge transport and bypass possible defects of individual polymer chains. Therefore, there is a long standing dream to achieve the synthesis of 2D conducting polymers to maximize interchain delocalization and achieve 2D delocalized transport [3]. In this talk, I will present a novel air-water interfacial methodology for the synthesis of 2D conducting polymers with controllable crystallinity, lateral size, orientation and crosslinking [4].

References

[1] Noriega, R., Rivnay, J., Vandewal, K., et al. Nat. Mater., 12 (2013), 1038.
[2] Kang, S. D., Snyder, G. J. Nat. Mater., 16 (2017), 252.
[3] Sirringhaus, H., Brown, P. J., Friend, R. H., et al. Nature, 401 (1999), 685.
[4] Zhang, T., Qi, H. Y., Liao, Z. Q., Zschech, E., Kaiser, U., Feng, X. L., et al. Submitted.