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# Multi-method characterization of conducting polymer thin films for thermoelectric applications

Poly(3-hexylthiophen-2,5-diyl) (P3HT) is one of the most prominent semiconducting, conjugated polymers in the fields of organic electronics and photovoltaics. Besides its high electric conductivity, it shows thermoelectric properties when doped with metal chlorides or nanoparticles, for example gold (Au). Thin thermoelectric P3HT films are of utmost importance and interest for future industrial applications. Here, it is essential to investigate the influence of different future large-scale fabrication techniques on the film quality and structure and, hence, its thermoelectric performance.
In the first step of this project, multiple polymer films of different thicknesses will be prepared using different P3HT-variants and dopant concentrations. Here, spin casting, spray deposition and slot-die coating will be used. In the second step, these samples key structural parameters, e.g. film thickness, surface roughness and electric conductivity, will be analyzed using different experimental techniques including atomic force microscopy (AFM) and ellipsometry as well as grazing incidence small-angle X-ray scattering (GISAXS) and X-ray reflectrometry (XRR). In the last step, all the obtained experimental data should be analyzed using the existing analysis routines.

Literature:
R. M. Kluge, et al., Adv. Funct. Mater. 2003092 (2020)

## Group

FS-PETRA-D (P03)

## Project Category

A1. Solid-state physics and nanoscience

## Special Qualifications

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