TECHNISCHE UNIVERSITÄT CHEMNITZ
Technische Universität Chemnitz, Fakultät für Naturwissenschaften, Institut für Physik, 09107 Chemnitz

Bachelor / Master thesis available
Topic: Organic molecule thin film characterization by spectroscopic ellipsometry

Motivation

Organic light emitting diodes based on thermally activated delayed fluorescent (TADF) materials have great potential in flat-panel displays and solid-state lighting due to their high internal quantum efficiency. To develop high quality devices, it is essential to understand the properties of the single compounds and especially the understanding of the optical properties of the materials is crucial. To that end, spectroscopic ellipsometry can be used as a state-of-the-art tool.

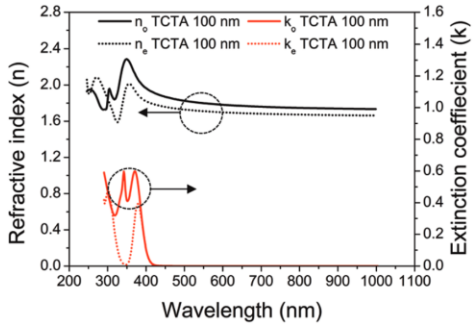

Fig. 1 Optical constants for the TADF molecule TCTA [1]

Research task

The work will start with an extensive literature survey of spectroscopic ellipsometry results for various organic compounds currently used in fabricating OLED structures within the HLPH group. Incorporation into the measurement and modeling software CompleteEASE will be carried out to streamline the data analysis process. Suitable models will be constructed based on the underlying physical properties of the materials to determine reasonable values for the optical constants, thickness, and roughness of the organic films. The results for thickness and roughness will be compared with atomic force microscopy data to validate their accuracy.
For a bachelor thesis the task will be shortened accordingly.

Fig.2 M-2000 Ellipsometer, which will be used to determine the ellipsometric data [2]

You will be part of our research team, where you will attend our weekly meetings and present as well as discuss your progress.

[1] Lee, Heui-Dong, *et al.* "Preferred Orientation Evolution of Hole Transport Materials for High Emitting Dipole Orientation Ratio of the Emitting Material." *Advanced Optical Materials* 11.2 (2023): 2202109.
[2] URL: https://www.jawoollam.com/products/m-2000-ellipsometer (07/24/2023)

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