Over the last several years organic semiconductor materials gain more and more importance. Two examples for such materials are pentacene (PEN) and perfluoropentacene (PFP). PEN is a polycyclic aromatic hydrocarbon (C\textsubscript{22}H\textsubscript{14}) with a HOMO-LUMO gap of approximately 2.1eV. Because of its high hole mobility it acts as an p-type semiconductor. The unit cell of PEN crystals contains two nonequivalent PEN molecules and crystallization takes always place in a triclinic crystal structure. In case of PFP (C\textsubscript{22}F\textsubscript{14}) the hydrocarbon atoms are replaced by fluorine atoms. The strong electronegativity of fluorine results in quite different properties of PFP from PEN. PFP acts as an n-type semiconductor and crystallizes in a monoclinic crystal structure. Transmission electron microscopy (TEM) is a useful method to investigate such structures at a high resolution level and thus to analyse the quality of PEN:PFP composite materials. Besides electron diffraction, dark field imaging, high resolution TEM and energy dispersive X-ray spectroscopy also electron energy loss spectroscopy (EELS) is a suitable method to learn more about the sample structure and composition. In case of organic materials the Plasmon peak located at energy losses in the range of 23 and 27 eV provides a possibility to obtain this information.

In our work we investigated codeposited PEN:PFP samples that have been grown on potassium chloride (KCl) via organic molecular beam deposition (OMBD). These samples are composed of a thin PEN film with fibers consisting of a mixture of PEN:PFP on top of it. Scanning transmission electron microscopy (STEM) enables the detection of EEL spectra from separate regions like the PEN:PFP fibers and the PEN film. For comparison also pure PFP samples have been investigated. The energetic position of the Plasmon peak for the three materials PEN, PFP and PEN:PFP is different. This provides information on the composition and thus on the structure of the sample.

In our presentation we will summarize the influence of different material compositions on the Plasmon peak position in EEL spectroscopy and show how EELS mapping in STEM can be used to characterize mixed organic films.

Acknowledgement: The authors gratefully acknowledge funding from the SFB 1083.