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Organic electronics found partly the way from academic research to industrial applications over recent years in a quickly growing market. This market covers especially application fields in light emitting diodes (LEDs) for instance in today's smart phone displays, field-effect transistors (FETs) and solar cells which open the window for novel types of opto-electronic technologies. The organic semiconductors consist of conjugated molecules which can be deposited into the devices as thin films from solution or from vapor, allowing large area and low cost fabrication. Moreover, many active compounds are mechanically flexible and therefore applicable to bendable electronic elements in contrast to traditional rigid inorganic electronics. This flexible nature of the devices also permits in future the fabrication of the devices by high speed and inexpensive methods at low temperatures by continuous in-line roll-to-roll technologies such as offset and rotary screen printing. The first reports on the mechanical robustness of organic semiconductors on flexible substrates are very encouraging. The devices operate stable or only slightly lose their initial performance under small mechanical bending conditions. To increase their potential for future flexible applications, a broad and basic knowledge of the mechanical behavior of conjugated polymers and small molecules as organic semiconductors in terms of their electronics properties is required. So far, only little information exists on this topic. Therefore, this project aims insight into the relation between molecular design, nano- and microstructure of the thin films and the electronic performance under the application of mechanical bending strain. The systematic control of the film deposition conditions linked with the variation in molecular structure, will allow us to gain a rational understanding of the correlations between these aspects.