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In-situ investigation of the sputter deposition of metal contacts on polymer thin films

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With their easy processability, high flexibility and tuneable optical properties, organic electronics offer a wide range of potential applications. Although based on organic materials, their electrodes are typically made from metals due to their unrivaled electronic conductivity. Thus, polymer-metal interfaces are inherently present and have a major influence on the device behavior. Understanding the growth mechanisms of metal contacts on polymer thin films plays a crucial role in identifying potential ways to enhance the device performance. We investigate the morphological changes during the sputter deposition of metal contacts onto photoactive polymer films via in-situ GISAXS [1]. This technique allows insights into the structural evolution of the metal on the organic film, which depends on various parameters such as the deposition rate or the film morphology. Making use of the brilliant synchrotron light source Petra III at DESY, we can study the film formation with outstanding spatial and temporal resolution. The metal layer formation can be described by applying an appropriate growth model based on our earlier work. [2] Comparing the deposition behavior of typical electrode materials on thin films of photoactive organic materials helps to understand their influence on the respective device performance.

[1] A. Hexemer, P. Müller-Buschbaum, IUCrJ 2, 106-125 (2015)
[2] M. Schwartzkopf et al., ACS Appl. Mater. Interfaces, 7(24), 13547-13556 (2015)
[3] M. Schwartzkopf et al.; ACS Appl. Mater. Interfaces, 9, 5629–5637 (2017)

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