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## **In-situ investigation of electrode sputter deposition for non-fullerene organic solar cell applications**

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Recently, the efficiencies of non-fullerene organic solar cells (OSCs) with small molecule acceptors rapidly increased to over 16%, which makes OSCs competitive to commercial available solid state solar cells. Except for the active layer, OSC performance is strongly influenced by the quality of anode layer, since it offers a path for carriers transport. Therefore understanding how metal electrodes grow on the active layer as well as the blocking layer plays a significant role in achieving high efficiency solar cells. For understanding the mechanism of the metal cluster growth on the active layer with various morphology, we introduce in-situ grazing incidence small angle X-ray scattering (GISAXS) technique to observe the morphology change during anode sputtering process. In addition, atomic force microscopy (AFM) and scanning electron microscope (SEM) techniques were used to get the surface morphology information of sputtered layers.

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