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## Facile and Low Cost Oxidative Conversion of MoS<sub>2</sub> in $\alpha$ -MoO<sub>3</sub>: Synthesis, Characterization and Application

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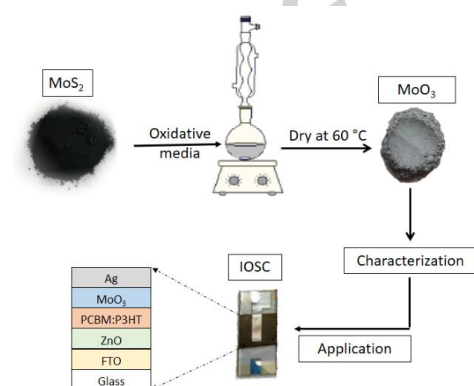
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### Abstract

This study describes a facile low cost route to synthesize the  $\alpha$ -MoO<sub>3</sub> through a conversion of the precursor MoS<sub>2</sub> in oxidant media. The structure and morphology of the  $\alpha$ -MoO<sub>3</sub> were studied by high resolution transmission electron microscopy (HRTEM) and selected area electron diffraction (SAED), X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS) and Raman spectroscopy. The results show that  $\alpha$ -MoO<sub>3</sub> was obtained with reduced size, high purity, strongly-preferred orientation and structural defects, which ensures versatility and multifunctionality to this sample. For the purpose of applications,  $\alpha$ -MoO<sub>3</sub> was successfully employed in inverted organic solar cells devices as a possible alternative to the PEDOT:PSS in the hole transportation layer.

### graphical abstract

Synthesis process based on low cost oxidative conversion of MoS<sub>2</sub> in  $\alpha$ -MoO<sub>3</sub>



**Keywords:**  $\alpha$ -MoO<sub>3</sub>, characterization, organic photovoltaic, synthesis.

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