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The influence of UVO irradiation on structural, morphological and optical properties of SnO2 thin films deposited by slot-die method

Tin (IV) oxide (SnO2) is a promising metal oxide (MO) semiconductor with potential in perovskite solar cells (PSCs) as an electron transport layer (ETL). The development of an additive-free SnO2 thin film with enriched optical properties using a cost-effective method is still a challenge. Herein, we report the influence of Ultraviolet ozone (UVO) on the additive-free hydrothermal synthesis of SnO2 and the deposition of thin film using the slot-die method. The thin films were characterised using a range of analytical techniques to evaluate their structural, morphological, and optical properties. X-ray diffraction (XRD) confirmed SnO2 crystallization into the tetragonal cassiterite phase. The surface irradiation of SnO2 thin films with Ultraviolet ozone (UVO) led to the increase in average grain size. Variation in the bandgap energy was observed following distinct changes in optical absorption upon UVO irradiance. The photoluminescence (PL) studies revealed the enhancement in defect emission intensity following UVO irradiance. These findings emphasize the significance of UVO irradiance in tuning the optical properties of SnO2 thin films for application as an ETL in PSCs.

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Primary author: Dr MOLEFE, Fokotsa (Tshwane University of Technology)

Co-authors: DIALE, Mmantsae (University of Preoria); Mr SEIMELA, Thapelo (University of Pretoria)

Presenter: Dr MOLEFE, Fokotsa (Tshwane University of Technology)

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