

Pulsed Laser Assisted Fabrication of 2D Chalcogenides for Energy Conversion Devices

Abstract

The two-dimensional (2D) Molybdenum disulphide (MoS_2) thin films were fabricated by pulsed laser ablation technique using a KrF excimer laser source, with temperature and thickness of the thin films controlled under *in-situ* conditions. The temperature of the films is varied from RT to 600 °C while the thickness is set by varying the deposition rate (30 sec - 600 sec). With increase in temperature, an improvement in crystallinity is observed leading to the enhancement of active sites in MoS_2 . The formation of MoS_2 and its associated phase structure were examined using Raman and XRD analysis. The crystalline nature and interlayer spacing of stacked MoS_2 structure were observed from HRTEM. The growth and thickness of MoS_2 thin films were evaluated using FESEM and AFM. Electrocatalytic behaviour of laser ablated films was carefully investigated and the photovoltaic performances of the fabricated cells were examined.