

INFLUENCE OF INITIAL SULFUR CONTENT IN PRECURSOR SOLUTION FOR THE GROWTH OF MOLYBDENUM DISULFIDE

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Abstract. This work investigated the influence of initial sulphur content in the precursor solution for the growth of molybdenum disulphide (MoS_2) films by thermal vapour sulfurization (TVS) with sol-gel spin coating as pre-deposition technique. The early introduction of sulphur shows the presence of grains which has uniformly distributed and homogeneous on the surface of the film. MoS_2 (002) planes are detected for both films with and without initial sulphur conditions, however, the presence of initial sulphur contents gives slightly higher intensity of diffraction peak. Two phonon modes for MoS_2 , namely the E_{2g} (in-plane) and the A_{1g} (out-of plane), are well detected from which the frequency difference of Raman peaks between E_{2g} and A_{1g} suggest the grown MoS_2 consisted of multi-layers. There is a slight shift of E_{2g} which is caused by the carbon impurities but no shift for A_{1g} . Besides, MoS_2 film with the presence of initial sulphur content shows better crystal as indicated by its narrower Raman peaks linewidth. Two broad absorption peaks of MoS_2 are detected at 614nm and 665nm. Hence, the early introduction of sulphur content in prepared precursor solution is one way of optimizing the growth of MoS_2 films.