

ABSTRACT

MoS₂ has a potential to be applied in flexible electronics and optoelectronic devices. In this study, MoS₂ powder was modified using liquid phase exfoliation method in which the MoS₂ powder diluted in NMP solvent is ultrasonicated for 60 hours and centrifuged for 30 minutes with a 2000 rpm rotational speed. We studied the effect of MoS₂ and NaOH variation on the properties of the obtained flakes. The flakes thickness characterization is performed by depositing the MoS₂ flakes onto a glass substrate and measuring the transmission of visible light which passed through the deposited sample. The results showed that the average thickness of MoS₂ layers vary from 3 to 14 nm when the concentration of MoS₂ are varied from 1 - 3 mg/ml without NaOH. The addition of NaOH reduces the layer thickness. Modification process of 2 mg/ml MoS₂ with 1 mg/ml NaOH produces the average thickness of about 7 nm. This value is smaller compared to the one modified without NaOH which has an average layer thickness of about 10 nm. To study the optoelectronic properties, the MoS₂ flakes were deposited on SiO₂ substrate. The current was measured when the voltage was varied from -3 V to 3 V and light intensity is modified from 0 - 1000 W/m². It is found that the conductivity of MoS₂ layer on SiO₂ was affected by the concentration of MoS₂ powders, the concentration of NaOH, and SiO₂ substrate conductivity. The increasing of MoS₂ concentration increases the MoS₂ layer conductivity. Whereas, the increasing of NaOH concentration decreases the conductivity of MoS₂ layer. The difference of SiO₂ substrate conductivity used in this experiment causes incorrect result, in which the conductivity of MoS₂ exfoliated with NaOH has higher conductivity than the one exfoliated without NaOH. Furthermore, the increasing of light intensity increases the conductivity of MoS₂ layer.

Keywords: *powder, MoS₂, liquid phase exfoliation, flakes, layer, thickness, conductivity.*