

## **ABSTRACT**

*MoS<sub>2</sub> has a potential to be applied in flexible electronics and optoelectronic devices. In this study, MoS<sub>2</sub> powder was modified using liquid phase exfoliation method in which the MoS<sub>2</sub> 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 MoS<sub>2</sub> and NaOH variation on the properties of the obtained flakes. The flakes thickness characterization is performed by depositing the MoS<sub>2</sub> 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 MoS<sub>2</sub> layers vary from 3 to 14 nm when the concentration of MoS<sub>2</sub> are varied from 1 - 3 mg/ml without NaOH. The addition of NaOH reduces the layer thickness. Modification process of 2 mg/ml MoS<sub>2</sub> 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 MoS<sub>2</sub> flakes were deposited on SiO<sub>2</sub> 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/m<sup>2</sup>. It is found that the conductivity of MoS<sub>2</sub> layer on SiO<sub>2</sub> was affected by the concentration of MoS<sub>2</sub> powders, the concentration of NaOH, and SiO<sub>2</sub> substrate conductivity. The increasing of MoS<sub>2</sub> concentration increases the MoS<sub>2</sub> layer conductivity. Whereas, the increasing of NaOH concentration decreases the conductivity of MoS<sub>2</sub> layer. The difference of SiO<sub>2</sub> substrate conductivity used in this experiment causes incorrect result, in which the conductivity of MoS<sub>2</sub> exfoliated with NaOH has higher conductivity than the one exfoliated without NaOH. Furthermore, the increasing of light intensity increases the conductivity of MoS<sub>2</sub> layer.*

**Keywords:** *powder, MoS<sub>2</sub>, liquid phase exfoliation, flakes, layer, thickness, conductivity.*