

## Photocatalysis of layered MoS<sub>2</sub> prepared by sonication in a mixed-solvent

(Graduate school of science, Hiroshima Univ<sup>1</sup>, Natural Science Center for Basic Research and Development(N-BARD), Hiroshima Univ<sup>2</sup>) ○Jingmin Tang<sup>1</sup>, Masanori Sakamoto<sup>1</sup>, Yufeng Wang<sup>1</sup>, and Ken-ichi Saitow<sup>1,2</sup>.

### Abstract :

Molybdenum disulfide (MoS<sub>2</sub>) composed of layer structure attracts much attention as a semiconductor material, whose band gap energy is changed from 1.29 eV as an indirect transition to 1.85 eV as a direct one, by changing the number of layers. Here, we show the exfoliation of MoS<sub>2</sub> using sonication in a mixed solvent (H<sub>2</sub>O and ethanol). The results of Raman spectra and atomic force microscope and transmission electron microscope images reveal that the exfoliated MoS<sub>2</sub> is composed of a few layers. Photocatalysis of the prepared MoS<sub>2</sub> was investigated by the degradation of a dye solution of methyl orange (MO) by irradiating light at the wavelength of 450 nm. As a result, the dye solution became colorless under the existence of the layered MoS<sub>2</sub> as a function of irradiation time. Note that the absorption band of MO disappears at around 460 nm, whereas a new band emerges at around 240 nm. This new band is considered as a hydrazine molecule, which can be produced from the photocatalytic reaction via the decomposition of MO.

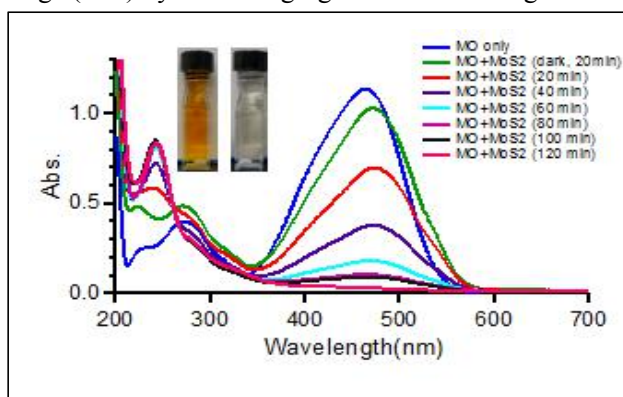


Figure S1. Absorption spectra of methylorange as a function of irradiation time. Spectra changes are caused by the reaction with photocatalyst of layered MoS<sub>2</sub>.

Fig .S1. MO degradation experiment.