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## Generation of MoS2 quantum dots by laser ablation of MoS2 particles in suspension and their photocatalytic activity for H-2 generation

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### Abstract

MoS2 quantum dots (QDs) have been obtained in colloidal suspensions by 532 nm laser ablation (7 ns fwhp/pulse, 50 mJ/pulse) of commercial MoS2 particles in acetonitrile. High-resolution transmission electron microscopy images show a lateral size distribution from 5 to 20 nm, but a more homogeneous particle size of 20 nm can be obtained by silica gel chromatography purification in acetonitrile. MoS2 QDs obtained by laser ablation are constituted by 3-6 MoS2 layers (1.8-4 nm thickness) and exhibit photoluminescence whose lambda(PL) varies from 430 to 530 nm depending on the excitation wavelength. As predicted by theory, the confinement effect and the larger periphery in MoS2 QDs increasing the bandgap and having catalytically active edges are reflected in an enhancement of the photocatalytic activity for H-2 generation upon UV-Vis irradiation using CH3OH as sacrificial electron donor due to the increase in the reduction potential of conduction band electrons and the electron transfer kinetics.

### Keywords

**Author Keywords:** Nanostructures; Few-layer chalcogenides; MoS2; Photocatalytic hydrogen generation; Photoluminescence; Energy conversion

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