

## **Interfacial Engineering of MoS<sub>2</sub> and Bimetallic MOF Hybrid for Superior Piezo-Photocatalytic Hydrogen Production and Wastewater Treatment**

Daniel Masekela <sup>a\*</sup>, Tunde L. Yusuf <sup>b</sup>, Sheriff A. Balogun <sup>a</sup>, Edwin Makhado <sup>a</sup>, Omolara I. Adeniran <sup>c</sup>, Kwena D. Modibane <sup>\*ad</sup>

<sup>a</sup> *Department of Chemistry, School of Physical and Mineral Sciences, University of Limpopo, Sovenga, Polokwane, 0727, South Africa*

<sup>b</sup> *Department of Chemistry, Faculty of Natural and Agricultural Sciences, University of Pretoria, Private Bag X20, Hatfield 0028, Pretoria, South Africa*

<sup>c</sup> *School of Chemistry and Physics, University of KwaZulu-Natal, Westville Campus, Chiltern Hills, Private Bag X54001, Durban, 4000, South Africa.*

<sup>d</sup> *DSI-NRF SARChI Chair in Photoelectrocatalytic Hydrogen Production, Department of Chemistry, School of Physical and Mineral Sciences, University of Limpopo (Turfloop), Polokwane, Sovenga 0727,*

**\*Corresponding author:** Daniel Masekela, **Email:** [masekeladaniel@gmail.com](mailto:masekeladaniel@gmail.com) or [daniel.masekela@ul.ac.za](mailto:daniel.masekela@ul.ac.za)

## Supplementary Figures

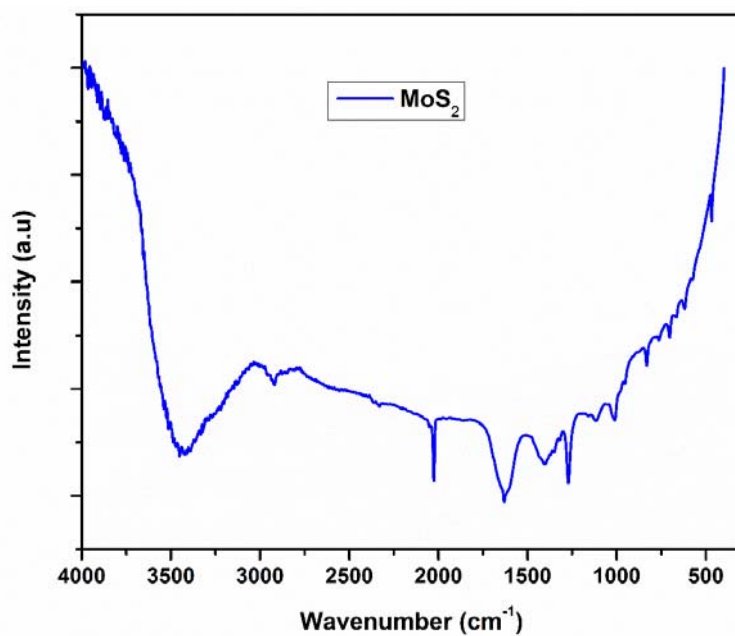


Figure S1: FTIR spectrum for MoS<sub>2</sub>

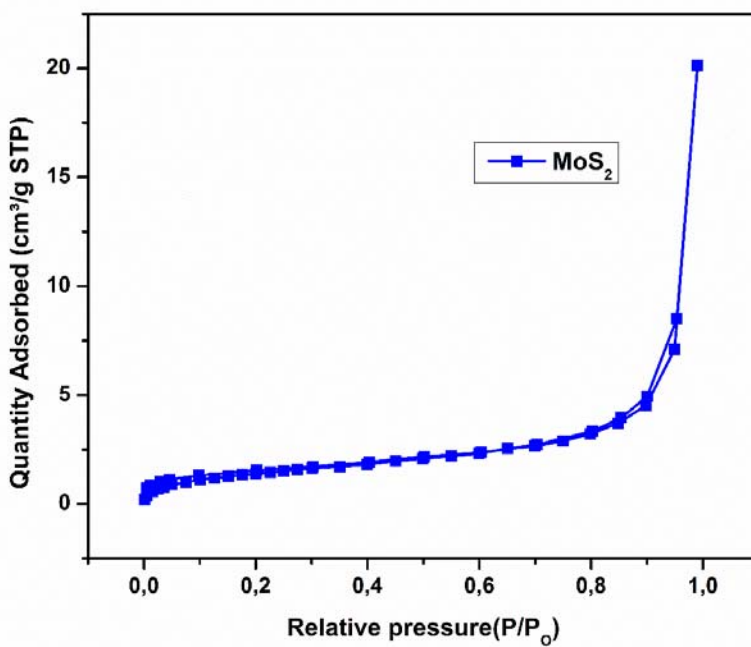


Figure S2: N<sub>2</sub> adsorption-desorption isotherms for MoS<sub>2</sub>

## Supplementary Tables

**Table S1:** Comparison studies on the piezocatalytic/photocatalytic hydrogen (H<sub>2</sub>) production

Catalyst	Process	Conditions	Efficiency	Ref
Sb-ZnO/MoS <sub>2</sub>	Piezo-photocatalysis	100 W Xe lamp and 30 W ultrasonic power	72.0 %	[1]
BiOBr/BiFeO <sub>3</sub>	Sonocatalysis	Ultrasonic power (500 W) and intensity (40 kHz)	73.64 %	[2]
Bi <sub>2</sub> MoO <sub>6</sub> /FeVO <sub>4</sub>	Sono-photocatalysis	40 kHz frequency and ultrasonic 50 W power, Xe lamp (500 W)	98.2 %	[3]
CdS/ZnO	Photocatalysis	Visible light irradiation	86.06 %	[4]
CdS/ZnSnO <sub>3</sub>	Photocatalysis	Visible-light irradiation (AuLight, CEL-HXF300/CEL-HXUV300, 100 mW/cm <sup>2</sup> )	95.04 %	[5]
ZnO/Carbon dots	Photocatalysis	UV light illumination (30 W, Philips, $\lambda = 365$ nm)	98.0 %	[6]
Fe-MOF@BiOBr/M-CN	Photocatalysis	300 W Xe lamp source (cutoff filter > 420 nm)	93.0 %	[7]
BiFeO <sub>3</sub> /Carbon dots	Piezo-photocatalysis	300 W Xe lamp and ultrasonic bath with frequency of 40 kHz	≈99.9 %	[8]
NaNbO <sub>3</sub> /g-C <sub>3</sub> N <sub>4</sub>	Piezo-photocatalysis	300 W Xe lamp and stirring at 1000 rpm	74.0 %	[9]
Sn-SrTiO <sub>3</sub>	Piezocatalysis	Ultrasonic cleaner (40 kHz, 80 W)	77.5 %	[10]
CdS QDs@MOF-808	Photocatalysis	300 W Xe lamp	82.0 %	[11]
MoS <sub>2</sub> @Cu/Co-MOF	Piezo-photocatalysis	100 W Xe lamp and UP400St ultrasonicator probe	82.0 %	<b>This work</b>

**Table S2:** Comparison studies on the piezocatalytic/photocatalytic degradation of CIP with existing piezo-photocatalyst

Catalyst	Process	Conditions	H <sub>2</sub> production	Ref
ZnO/ZnS/MoS <sub>2</sub>	Piezo-photocatalysis	100 W Xe lamp, ultrasonic cleaner (40 kHz, 200 W)	10.42 mmol g <sup>-1</sup> h <sup>-1</sup>	[12]
CZS-ZO@C/PVDF	Piezo-photocatalysis	(Xe lamp, 300 W), ultrasound excitation (40 kHz, 50 W)	34.9 mmol g <sup>-1</sup> h <sup>-1</sup>	[13]
PbTiO <sub>3</sub> /CdS	Piezo-photocatalysis	300 W Xe lamp and a 100 W ultrasonic generator (40 kHz)	849.0 μmol h <sup>-1</sup> g <sup>-1</sup>	[14]
Co-CuO	Photocatalysis	150 W Osram lamp	978.04 μmol	[15]
Co-MOF/GO	Photocatalysis	150 W halogen lamp	95.7 mmol g <sup>-1</sup> h <sup>-1</sup>	[16]
MoS <sub>2</sub> QDs@Vs-M-ZnIn <sub>2</sub> S <sub>4</sub>	Photocatalysis	300 W Xe arc lamp	6.884 mmol g <sup>-1</sup> h <sup>-1</sup>	[17]
rGO/CdS/MoS <sub>2</sub>	Photocatalysis	300 W Xe lamp source (cutoff filter > 420 nm)	72 mol h <sup>-1</sup>	[18]
SrTiO <sub>3</sub> /BaTiO <sub>3</sub>	Piezo-photocatalysis	300 W Xe lamp and ultrasonic bath with frequency of 40 kHz	1950.2 μmol g <sup>-1</sup> h <sup>-1</sup>	[19]
Bi <sub>2</sub> S <sub>3</sub> /Bi <sub>0.5</sub> Na <sub>0.5</sub> TiO <sub>3</sub>	Piezo-photocatalysis	Ultrasonic treatment (40 kHz, 180 W), and 45 W metal halide lamp	1019.39 μmol g <sup>-1</sup> h <sup>-1</sup>	[20]
MoS <sub>2</sub> @Cu/Co-MOF	Piezo-photocatalysis	100 W Xe lamp and UP400St ultrasonicator probe	1308.028 μmol	<b>This work</b>

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