MoS₂/Cellulose-doped ZnO nanorods for catalytic, antibacterial and molecular docking studies

Muhammad Ikram^a, Muhammad Imran^b, Shoukat Hayat^c, Anum Shahzadi^d, Ali Haider^e, Sadia Naz^f, Anwar Ul-Hamid^g, Walid Nabgan^h, Iqra Fazal^c, Salamat Ali^c

^aSolar Cell Application Research Lab, Department of Physics, Government College University Lahore, Lahore, 54000, Punjab, Pakistan

^bState Key Laboratory of Chemical Resource Engineering, Beijing Advanced Innovation Centre for Soft Matter Science and Engineering, Beijing Engineering Center for Hierarchical Catalysts, Beijing University of Chemical Technology, Beijing 100029, China ^cDepartment of Physics, Riphah Institute of Computing and Applied Sciences (RICAS), Riphah International University, 14 Ali Road, Lahore, Pakistan

^dFaculty of Pharmacy, University of the Lahore, Lahore, Pakistan

^eDepartment of Clinical Medicine and Surgery, University of Veterinary and Animal Sciences, Lahore 54000, Punjab, Pakistan

^fTianjin Institute of Industrial Biotechnology, Chinese Academy of Sciences, Tianjin 300308, China.

^gCore Research Facilities, King Fahd University of Petroleum & Minerals, Dhahran, 31261, Saudi Arabia

^hSchool of Chemical and Energy Engineering, Faculty of Engineering, Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia.

Corresponding Authors: ^adr.muhammadikram@gcu.edu.pk; ^ganwar@kfupm.edu.sa, <u>hwnabgan@gmail.com</u>

Material	Concentration	Inhibition zone (mm)		Deference
		S. aureus	E. coli	Kelelelice
MoS ₂ /ZnO	2 mg		45% reduction	[1]
Zr doped MoS ₂	1 mg	1	2.95	[2]
MoS_2	100 mg	25	27	[3]
Chitosan-MoS ₂	100 mg	32	35	
MoS ₂ -ZnO-rGO	100 µg	18.3 ± 1.3	20.6 ± 1.5	[4]
Mg:ZnO	1000 µg	4.15	8.65	[5]
10% Ag-MoS ₂	1000 µg	6.05	2.95	[6]
				Present
MoS ₂ /CNC-doped ZnO NRs	1 mg	12.55	6.5	Work

Table S1: Comparative antimicrobial evaluation of MoS₂/CNC-doped ZnO NRs

REFERENCES

[1] Awasthi, G.P., Adhikari, S.P., Ko, S., Kim, H.J., Park, C.H. and Kim, C.S., 2016. Facile synthesis of ZnO flowers modified graphene like MoS2 sheets for enhanced visible-light-driven photocatalytic activity and antibacterial properties. *Journal of Alloys and Compounds*, 682, pp.208-215.

[2] Ikram, M., Tabassum, R., Qumar, U., Ali, S., Ul-Hamid, A., Haider, A., Raza, A. and Imran, M., 2020. Promising performance of chemically exfoliated Zr-doped MoS 2 nanosheets for catalytic and antibacterial applications. *RSC Advances*, *10*(35), pp.20559-20571.

[3] Kasinathan, K., Murugesan, B., Pandian, N., Mahalingam, S., Selvaraj, B. and Marimuthu, K., 2020. Synthesis of biogenic chitosan-functionalized 2D layered MoS2 hybrid nanocomposite and its performance in pharmaceutical applications: in-vitro antibacterial and anticancer activity. *International journal of biological macromolecules*, *149*, pp.1019-1033.

[4] Priyadharsan, A., Shanavas, S., Vasanthakumar, V., Balamuralikrishnan, B. and Anbarasan, P.M., 2018. Synthesis and investigation on synergetic effect of rGO-ZnO decorated MoS2 microflowers with enhanced photocatalytic and antibacterial activity. *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, *559*, pp.43-53.

[5] Ikram, M., Aslam, S., Haider, A., Naz, S., Ul-Hamid, A., Shahzadi, A., Ikram, M., Haider, J., Ahmad, S.O.A. and Butt, A.R., 2021. Doping of Mg on ZnO Nanorods Demonstrated Improved Photocatalytic Degradation and Antimicrobial Potential with Molecular Docking Analysis. *Nanoscale Research Letters*, *16*(1), pp.1-16.

[6] Qumar, U., Hassan, J., Naz, S., Haider, A., Raza, A., Ul-Hamid, A., Haider, J., Shahzadi, I., Ahmad, I. and Ikram, M., 2021. Silver decorated 2D nanosheets of GO and MoS2 serve as nanocatalyst for water treatment and antimicrobial applications as ascertained with molecular docking evaluation. *Nanotechnology*, *32*(25), p.255704.