

Supporting information

Tuning Dopant Incorporation in Tin Oxide Thin Films Using a Methanol– Water Solvent for Photovoltaic and Water Splitting Applications

Musarrat Zahra^a, Shafqat Hussain^b, Khurram Shehzad^c, Ahsan jamal^d, Kashif Yaqub^e, Muhammad Rehan^f,
Mohsin Ali Raza Anjum^d, Jaweria Ambreen^{a*}, Muhammad Saifullah^{d*}

^aDepartment of Chemistry, COMSATS University Islamabad, Park Road, 45550, Islamabad, Pakistan.

^bPhysics Division (PD), Pakistan Institute of Nuclear Science and Technology (PINSTECH), Islamabad, Pakistan.

^cCentral Analytical Facility Division (CAFD), Pakistan Institute of Nuclear Science and Technology (PINSTECH), Islamabad, Pakistan.

^dChemistry Division (CD), Pakistan Institute of Nuclear Science and Technology (PINSTECH), P.O. Box 45650, Nilore, Islamabad, Pakistan.

^eLINAC Project, Pakistan Institute of Nuclear Science and Technology (PINSTECH), Nilore 45650, Islamabad, Pakistan

^fPhotovoltaic Research Department, Korea Institute of Energy Research (KIER), Daejeon, South Korea.

Corresponding authors:

Jaweria Ambreen (Jaweria.ambreen@comsats.edu.pk)

Muhammad Saifullah (Saifi.551@gmail.com)

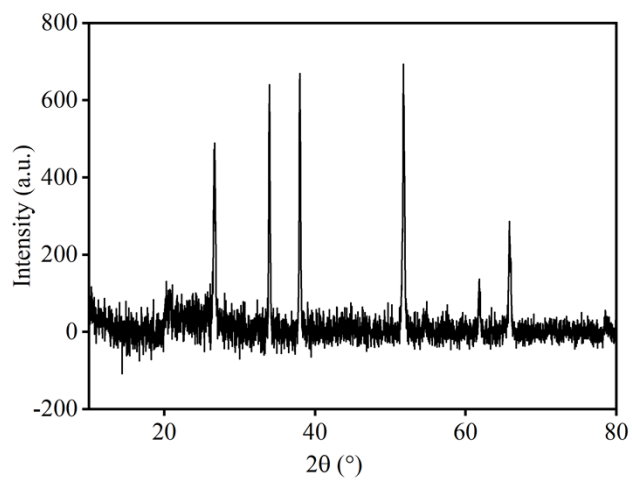


Fig. S1: XRD pattern of WO₃-coated FTO thin film.

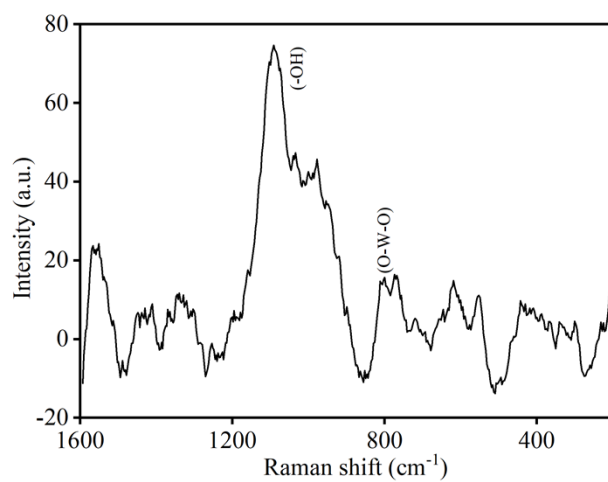
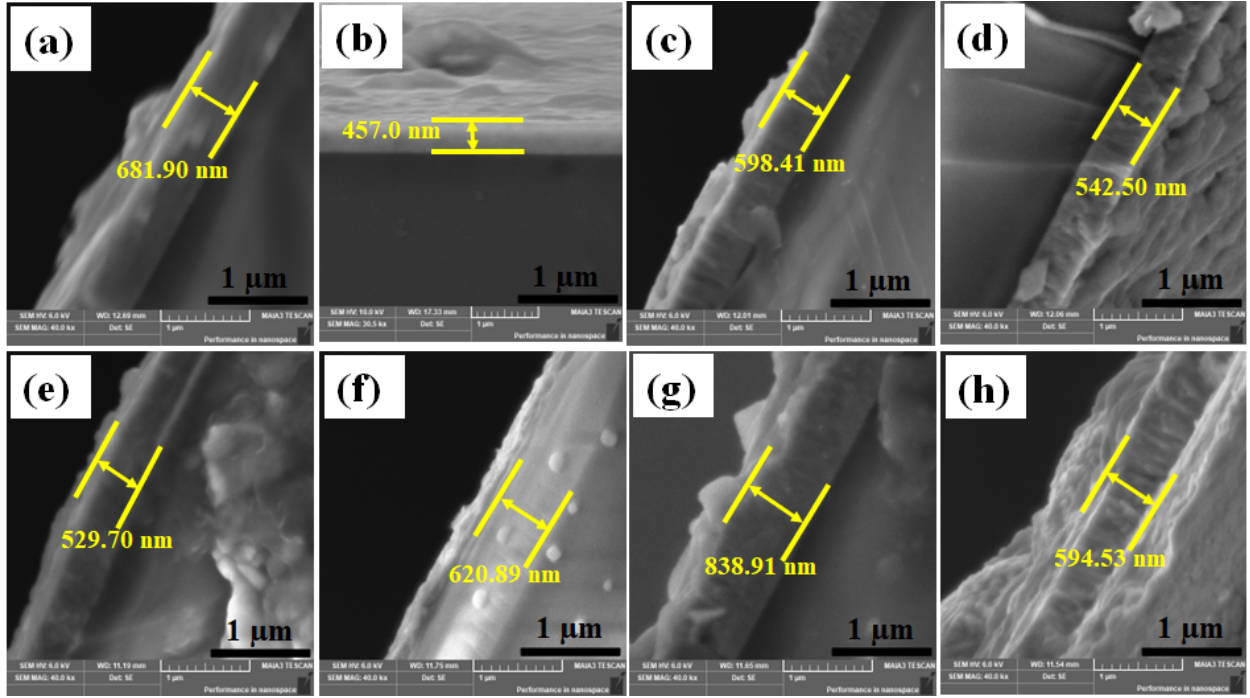


Fig. S2: Raman profile of WO₃-coated FTO thin film.



28

29 **Fig. S3:** SEM cross-sectional images of the prepared FTO thin films, (a) M0.4, (b) M0.8, (c)
 30 M1.2, (d) M1.6, (e) M2.0, (f) M2.4, (g) M2.8, and (h) M3.2 upon varying F/Sn molar ratio in the
 31 spraying solution.

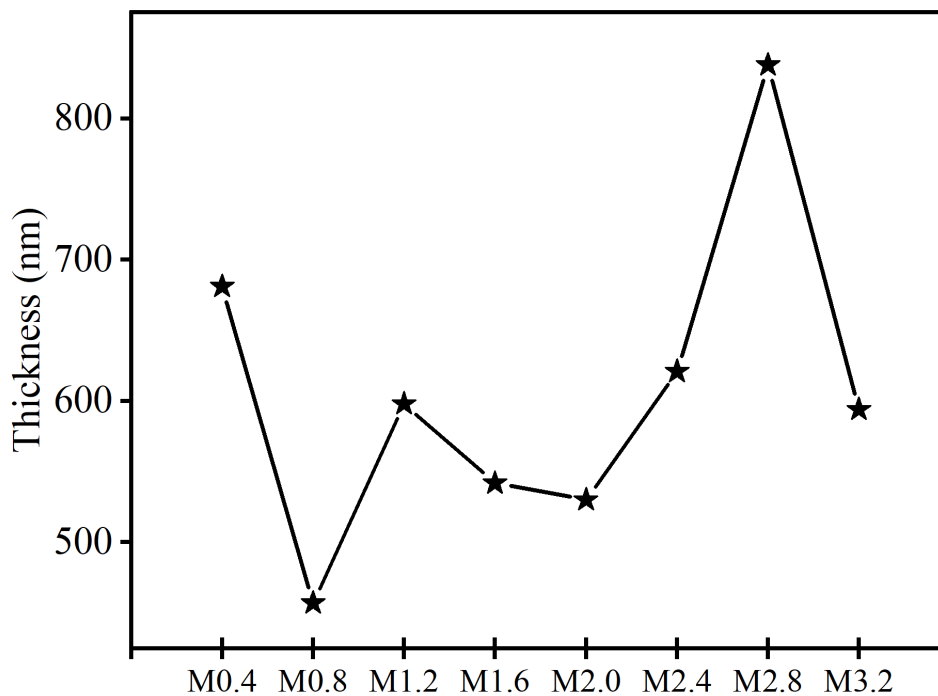


Fig. S4: A correlation of the thickness of FTO thin films with F/Sn molar ratios.

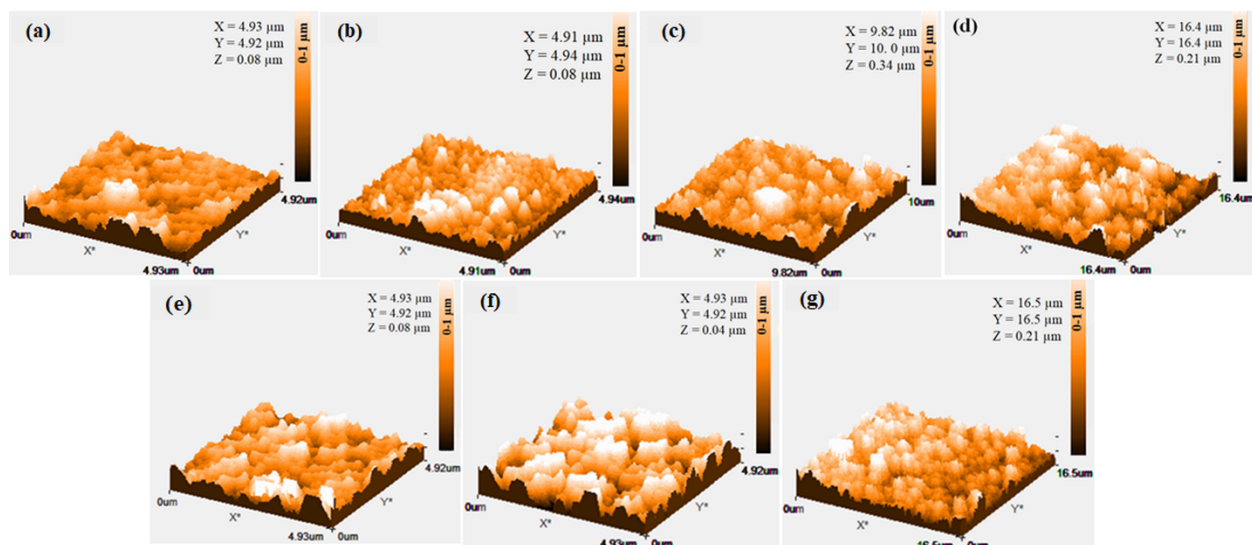


Fig. S5: 3D AFM scans of the prepared FTO thin films upon varying F/Sn molar ratio in the spraying solution; (a) M0.4, (b) M0.8, (c) M1.2, (d) M1.6, (e) M2.0, (f) M2.4, and (g) M3.2.