Electronic Supplementary Information

Surface Plasmon Resonance Biosensor Chip Integrated with MoS_2-MoO_3 Hybrid Microflowers for Rapid CFP-10 Tuberculosis Detection

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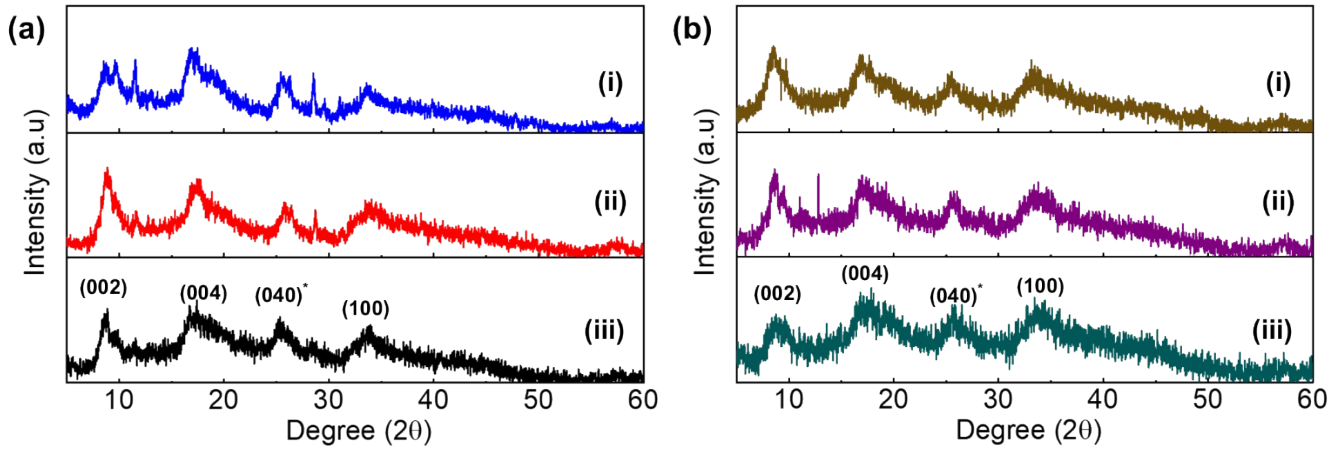

Fig. S1. (a) The X-ray diffraction (XRD) spectra of synthesized MoS_2-MoO_3 with (a) pH of 8 (i), 7 (ii), and 6 (iii), and (b) Na_3Ct variation of 0.5 g (i), 0.25 g (ii), and 0.125 g (iii). The XRD patterns exhibit MoS_2 crystal structure with the presence of MoO_3 (marked by asterisk sign).

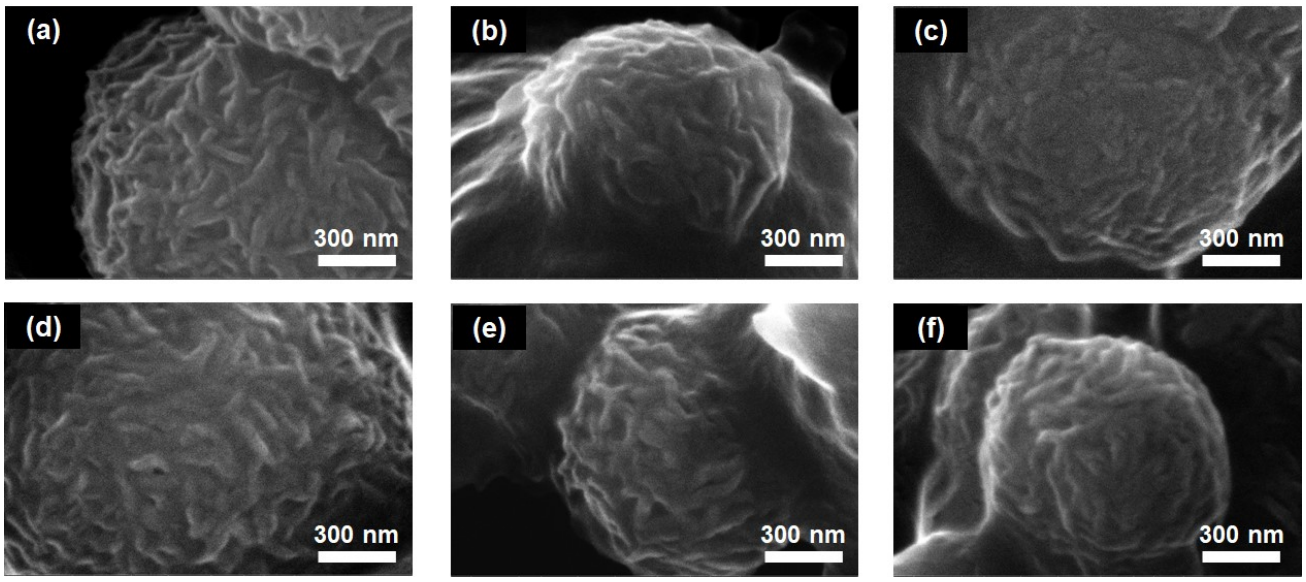

Fig. S2. High-magnification scanning electron microscopy (SEM) images of synthesized MoS_2-MoO_3 at (a) pH 6; (b) pH 7; (c) pH 8; and synthesized MoS_2-MoO_3 at pH 7 with Na3Ct addition of (d) 0.125 g; (e) 0.25 g; and (f) 0.5 g.

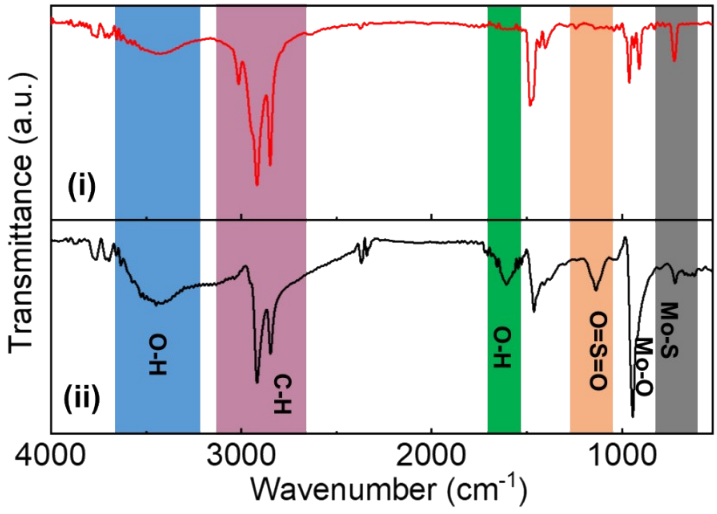

Fig. S3. The Fourier transform infrared spectroscopy (FTIR) spectra of (i) cetyltrimethylammonium bromide (CTAB) and (ii) MoS_2-MoO_3 with 0.5 g of Na_3Ct.

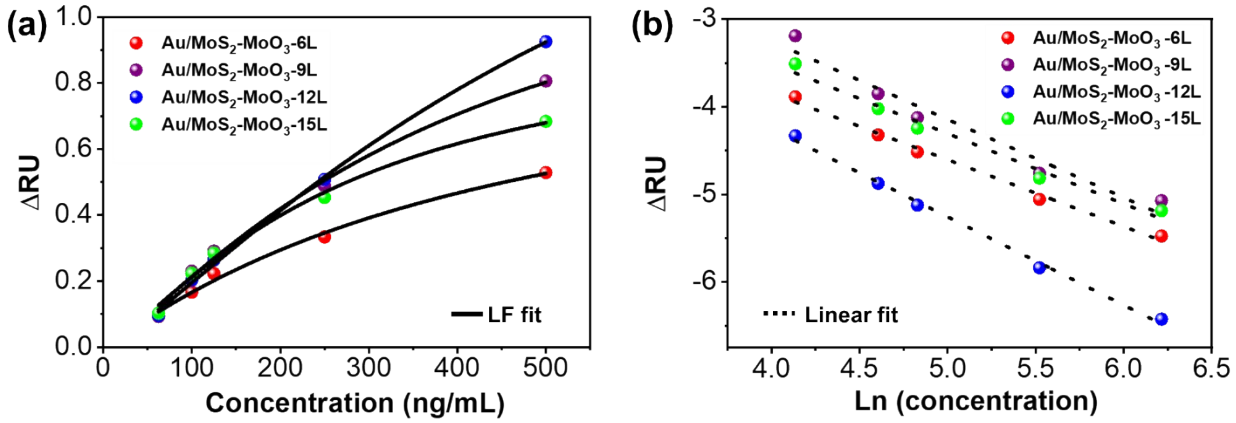

Fig. S4. (a) The CFP-10 concentration vs. ΔRU with LF fit curve and (b) linear regression of $ln(k_{LF}/\Delta RU)$ vs. $ln(C)$ for four different Au/MoS_2-MoO_3 sensors (i.e., 6L, 9L, 12L, and 15L).

Table S1. The parameters obtained from the linear regression $ln(k_{LF}/\Delta RU)$ vs. $ln(C)$, resulting in sensitivity and LOD of the biosensors.

Chip	Parameters			
	Linear equation	R^2	Sensitivity	LOD (S/N = 3) ng/mL
Au/MoS_2-MoO_3 6L	$C) = -0.7620\ ln(k_{LF}/\Delta RU) - 0.7944$	0.997	0.7620	6.5523
Au/MoS_2-MoO_3 9L	$C) = -0.8875\ ln(k_{LF}/\Delta RU) - 0.2641$	0.996	0.8875	3.9423
Au/MoS_2-MoO_3 12L	$C) = -1.0059\ ln(k_{LF}/\Delta RU) - 0.2130$	0.998	1.0059	3.4473
Au/MoS_2-MoO_3 15L	$C) = -0.8062\ ln(k_{LF}/\Delta RU) - 0.2026$	0.994	0.8062	5.7604

Table S2. The performance comparison of several tuberculosis (TB) biosensors having different detection techniques and target analytes.

Detection technique	Target analyte	Material	Assay time	Detection range	LOD	Ref.
ELISA	ESAT-6	-	>3 h	47 – 3000 ng/mL	179 ng/mL	[1]
ELISA	ESAT-6	Au nanoparticles		47 – 3000 ng/mL	23.95 ng/mL	[1]
Electrochemical	CFP-10	Graphene/polyaniline-modified screen-printed gold electrode	3 h	20 – 100 ng/mL	15 ng/mL	[2]
Electrochemical	ESAT-6	dithiobissuccinimidyl propionate-modified electrode	-	10 – 50,000 ng/mL	7 ng/mL	[3]
SPR	CFP-10	Au	30 min	100 – 1000 ng/mL	100 ng/mL	[4]
SPR	Ag85 protein	Au	-	10 – 1000 ng/mL	10 ng/mL	[5]
SPR	**CFP-10**	**Au/MoS_2-MoO_3**	**12 min**	**62.5 – 500 ng/mL**	**3.45 ng/mL**	**This work**

Reference:

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