Supplemental Information

Layered MoS_2-graphene composites for biosensor applications with sensitive electrochemical performance

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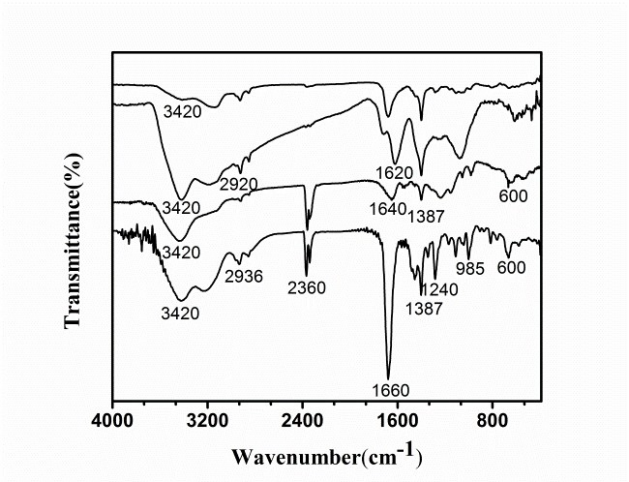

Fig. S1 FT-IR spectra of (a) MoS_2, (b) graphene, (c) layered MoS_2-graphene film, and (d) layered Mb/MoS_2-graphene/Nafion composite film.

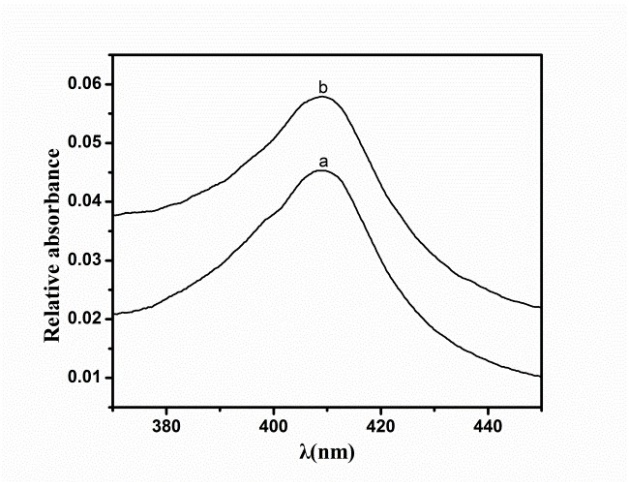

Fig. S2 UV-vis spectroscopy of (a) dry Mb film, and (b) dry layered Mb/MoS_2-graphene/Nafion film in pH 7.0 buffers.

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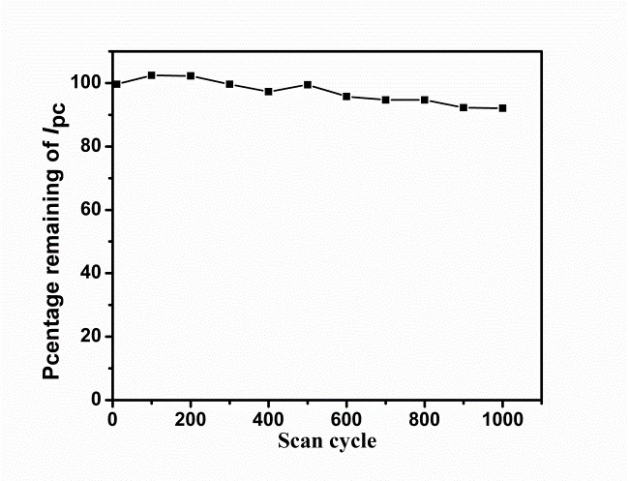

Fig. S3 The influence of the scan cycle numbers on the CV reduction peak current I_{pc} for the layered Mb/MoS_2-graphene/Nafion films at a scan rate of 0.1 V s^{-1} in pH 7.0 buffers.

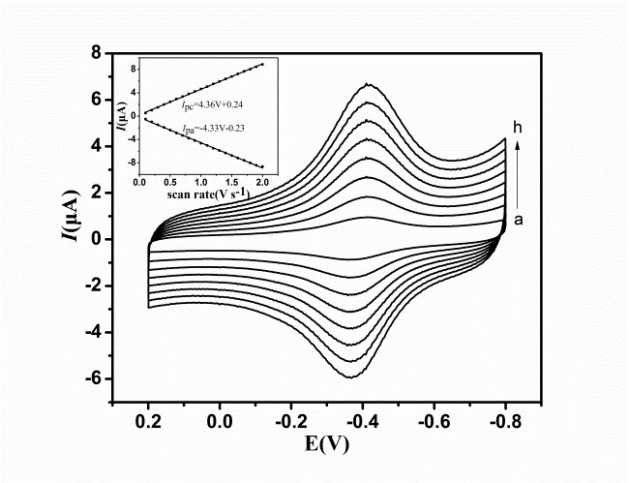

Fig. S4 CVs of layered Mb/MoS_2-graphene/Nafion films in pH 7.0 buffers with different scan rates (a to h: 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8 V s^{-1}). Insert is the relationship of anodic and cathodic peak currents versus scan rate.

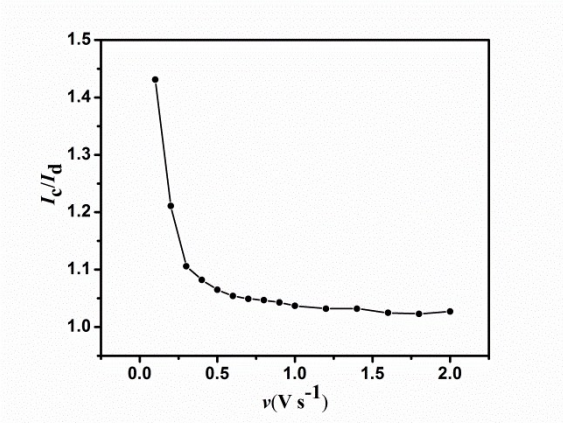

Fig. S5 Influence of scan rate on catalytic efficiency, I_c/I_d, for layered Mb/MoS_2-graphene/Nafion film in 8 mL pH 7.0 buffers, where I_d is the CV reduction peak current in buffer without oxygen and I_c is the CV reduction peak current with 40 mL of air injected.

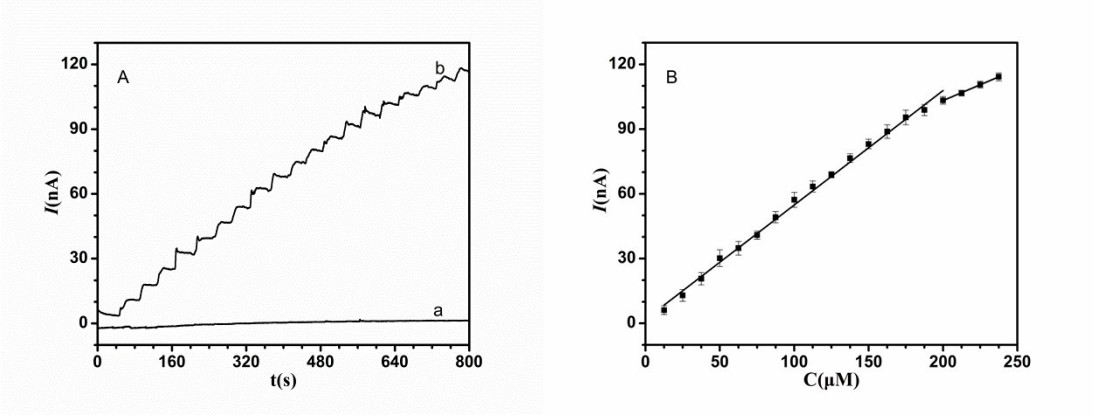

Fig. S6 Plot A: Amperometric response of (a) layered MoS_2-graphene/Nafion film, and (b) layered Mb/MoS_2-graphene/Nafion film at -0.1 V in pH 7.0 buffer solution with 10 μM H_2O_2 injected every 40 s. Plot B shows the calibration curve of amperometric currents and the concentrations of H_2O_2.

S7 RSD was calculated as following:

$$RSD = \frac{\sqrt{\sum_{i=1}^{n}(X_i - \bar{X})^2}}{\bar{X}} \times 100\%$$

X_i= 0.58, 0.60, 0.61, 0.59, 0.61 μA

$$\bar{X} = \frac{\sum_{i=1}^{n} X_i}{n}$$

Table S1 The electrochemical parameters for different Mb-films on GCE

Film	ΔE_p/mV	I_{pc}/μA	$E^{0'}$/V vs SCE	Γ*/mol cm^{-2}	Γ*/Γ%
Mb/graphene/Nafion	61	0.70	-0.37	5.09×10^{-11}	1.29%
Mb/MoS_2/Nafion	60	0.79	-0.37	6.84×10^{-11}	1.73%
Layered Mb/MoS_2-graphene/Nafion	52	1.06	-0.38	9.00×10^{-11}	2.27%

$E^{0'}$: the formal potential estimated as the midpoint of reduction and oxidation peak potentials; $\Delta E_p = E_{pa} - E_{pc}$: the separation between the anodic and the cathodic peak potentials; I_{pc}: the cathodic peak current; Γ*: the surface concentration of electroactive Mb in different Mb-film. These data were estimated by CVs in pH 7.0 buffers at a scan rate of 0.2 V s^{-1}.