# Electronic Supplementary Information

## Efficient Electrochemical Detection of Cancer Cells on *in-situ* Surface-Functionalized $MoS_2$Nanosheets

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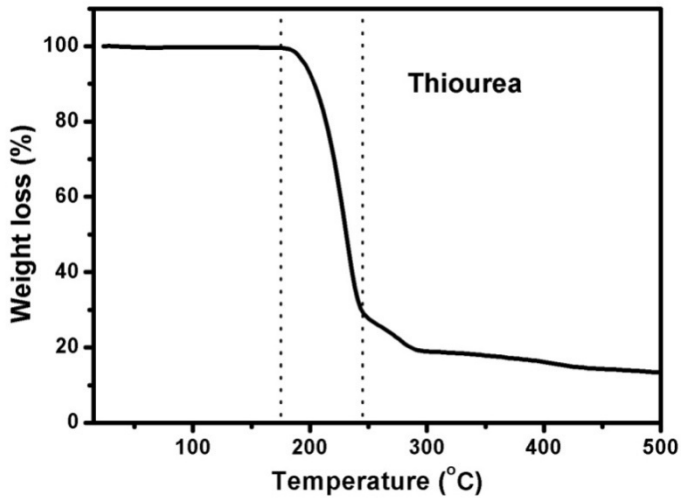


**Fig. S1** TGA curve of bare thiourea (TU), showing an obvious weight loss from 175 to 245°C associated with TU decomposition.

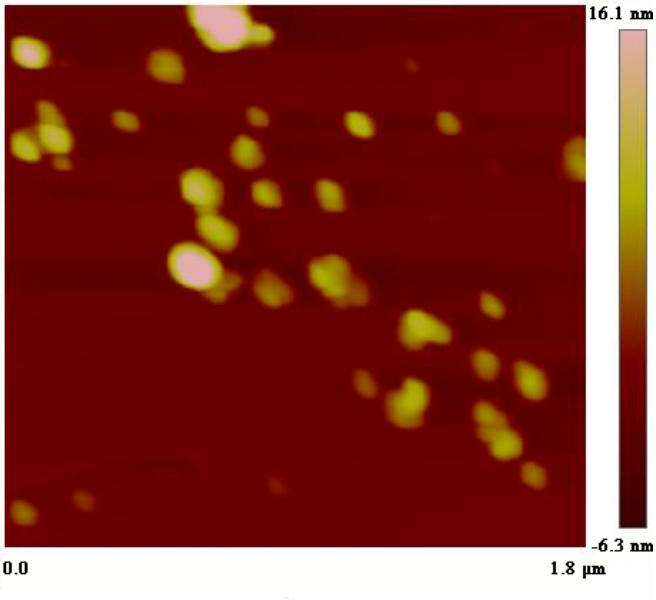


**Fig. S2** AFM image of TU-$MoS_2$.

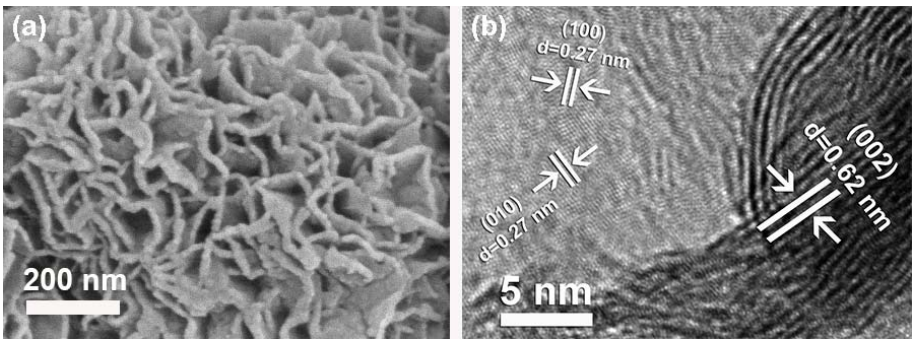


**Fig. S3** (a) SEM and (b) HR-TEM images of bare $MoS_2$ after removing TU by $H_2SO_4$ treatment. After the treatment with 0.05 M $H_2SO_4$ at 150 °C, the bare $MoS_2$ nanosheets are finally received. The SEM image of $MoS_2$ (Figure S3a) identifies the nanosheet-like morphology similar with TU-$MoS_2$. The HR-TEM (Figure S3b) shows the visible lattice fringe of 0.27 nm indexed as the (100) or (010) of hexagonal $MoS_2$, and an interlayer spacing of 0.62 nm corresponding to $MoS_2$(002).

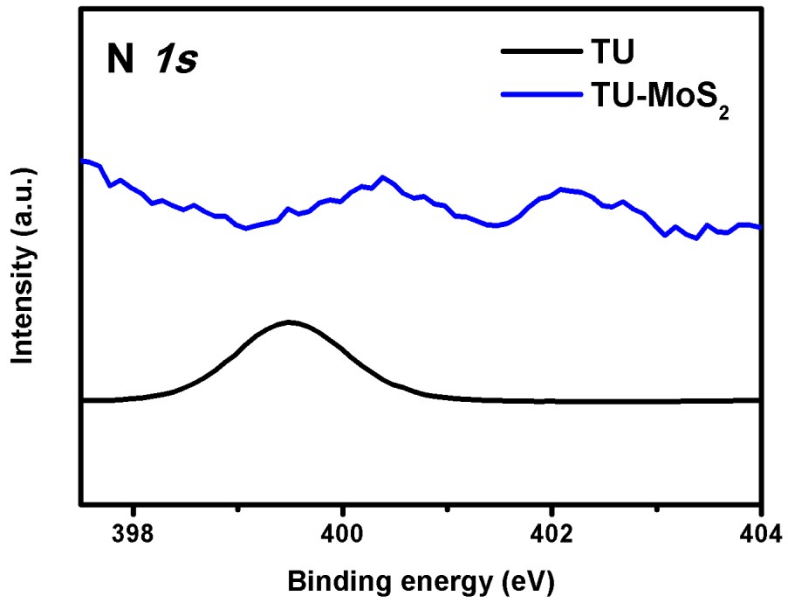


**Fig. S4** XPS profiles of N 1s in TU-$MoS_2$ and thiourea (TU).

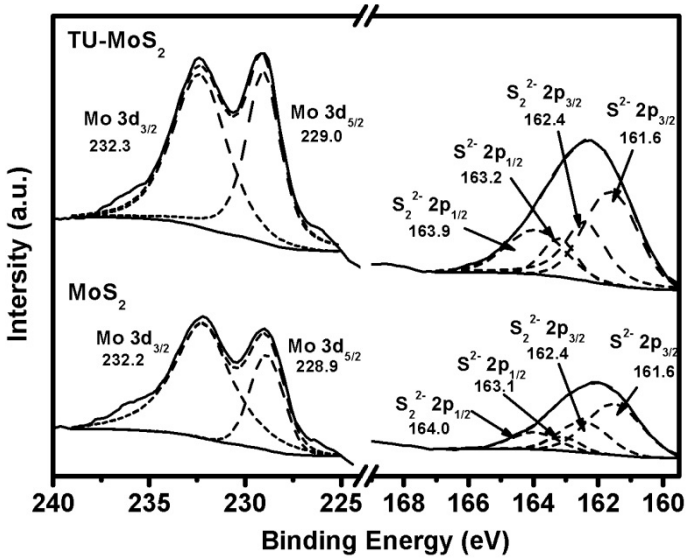


**Fig. S5** XPS profiles of Mo 3d and S 2p in TU-$MoS_2$ and bare $MoS_2$, showing the coincident peaks of Mo $3d_{3/2}$, Mo $3d_{5/2}$, S $2p_{1/2}$, and S $2p_{3/2}$ in the both tow samples. The similar chemical environment of Mo and S is reasonably indicated in TU-$MoS_2$ and $MoS_2$.

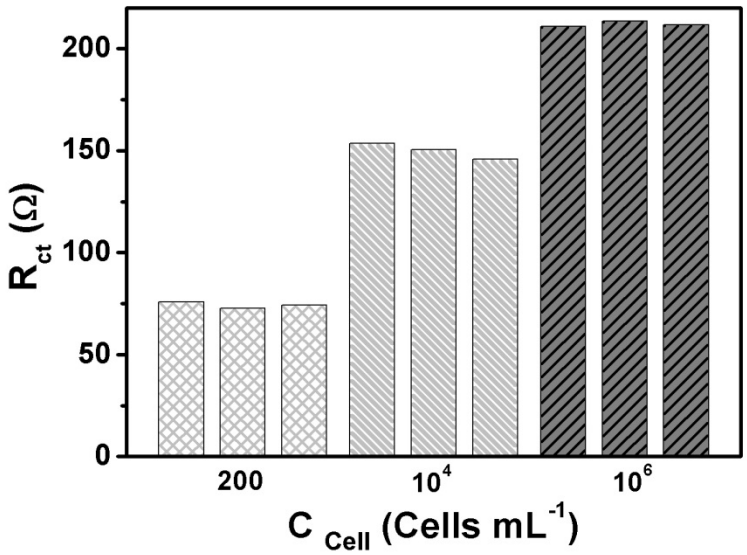


**Fig. S6** Reproducibility of GE11/TU-$MoS_2$/GCEs biosensor for the repeated three tests with different HepG2 concentration.

**Table S1** Comparison of different cytosensor material for HepG2 cell detection.

| Method | cytosensor material | Linear range [cells $mL^{-1}$] | Detection limit [cells $mL^{-1}$] | Ref. |
|---|---|---|---|---|
| Electrochemical impedance spectroscopy | TU-$MoS_2$nanosheets | 50 - $2.0\times10^6$ | 50 | This work |
| Differential pulse volammetry | G-quadruplex/hemin /aptamer–AuNPs–HRP | $1.0\times10^2$–$1.0\times10^7$ | 30 | [1] |
| ICP-MS | CdSe/ZnS QDs | 200-$3\times10^4$ | 61 | [2] |
| Electrochemiluminescence | $TiO_2$/CdS | 400 – $1.0\times10^4$ | 396 | [3] |
| Electrochemiluminescence | ZnO@CdS nanorods | $3.0\times10^2$–$1.0\times10^4$ | 256 | [4] |
| Atomic force microscope | Au microcantilever | $1.0\times10^3$-$1.0\times10^5$ | 300 | [5] |


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