Electronic Supplementary Material (ESI) for Materials Advances.

Supporting Information

Ultrasensitive low-probe-concentration PANC-1 and MCF-7 cancer cell sensors enabled by combined 2D-material-polymer-phage frameworks

Denise Lee[1], Sophia Shuwn-Yi Chan[1], J Shamita Naikar[2], Maria Prisca Meivita,[1] Wey-Chyi Teoh,[2]

Natasa Bajalovic,[1,*] Desmond K. Loke,[1,2,*]

[1]*Department of Science, Mathematics and Technology, Singapore University of Technology and Design, Singapore 487372, Singapore*

[2]*Office of Innovation, Changi General Hospital, Singapore, 529889, Singapore*

[*]*Correspondence and requests for materials should be addressed to N.B. (email: natasa_bajalovic@sutd.edu.sg) or D.K.L. (email: desmond_loke@sutd.edu.sg)*

Table S1. Information of the references in Fig. S2

Ref No.	Reference
1	Chen, Y. F.; Wu, H. W.; Hong, Y. H.; Lee, H. Y. 40 GHz RF Biosensor Based on Microwave Coplanar Waveguide Transmission Line for Cancer Cells (HepG2) Dielectric Characterization. *Biosens. Bioelectron.* **2014**, *61*, 417–421. https://doi.org/10.1016/j.bios.2014.05.060
2	Cheng, X.; Liu, Y. S.; Irimia, D.; Demirci, U.; Yang, L.; Zamir, L.; Rodríguez, W. R.; Toner, M.; Bashir, R. Cell Detection and Counting through Cell Lysate Impedance Spectroscopy in Microfluidic Devices. *Lab Chip* **2007**, *7* (6), 746–755. https://doi.org/10.1039/B705082H
3	Sharon, E.; Golub, E.; Niazov-Elkan, A.; Balogh, D.; Willner, I. Analysis of Telomerase by the Telomeric Hemin/G-Quadruplex-Controlled Aggregation of Au Nanoparticles in the Presence of Cysteine. *Anal. Chem.* **2014**, *86* (6), 3153–3158. https://doi.org/10.1021/ac5000152
4	Rocha Neto, J. B. M.; Soares, A. C.; Bataglioli, R. A.; Carr, O.; Costa, C. A. R.; Oliveira, O. N.; Beppu, M. M.; Carvalho, H. F. Polysaccharide Multilayer Films in Sensors for Detecting Prostate Tumor Cells Based on Hyaluronan-CD44 Interactions. *Cells* **2020**, *9* (6), 1563. https://doi.org/10.3390/cells9061563
5	Garcia, D.; Ghansah, I.; LeBlanc, J.; Butte, M. J. Counting Cells with a Low-Cost Integrated Microfluidics-Waveguide Sensor. *Biomicrofluidics* **2012**, *6* (1), 014115. https://doi.org/10.1063/1.3689857

Table S2. Information of the references in Fig. S3.

Ref No.	Reference
1	Zhang, X.; Xiao, K.; Cheng, L.; Chen, H.; Liu, B.; Zhang, S.; Kong, J. Visual and Highly Sensitive Detection of Cancer Cells by a Colorimetric Aptasensor Based on Cell-Triggered Cyclic Enzymatic Signal Amplification. *Anal. Chem.* **2014**, *86* (11), 5567–5572. https://doi.org/10.1021/AC501068K.
2	Pan, C.; Guo, M.; Nie, Z.; Xiao, X.; Yao, S. Aptamer-Based Electrochemical Sensor for Label-Free Recognition and Detection of Cancer Cells. *Electroanalysis* **2009**, *21* (11), 1321–1326. https://doi.org/10.1002/elan.200804563.
3	Liu, L.; Lv, R. J.; Leung, J. K.; Zou, Q.; Wang, Y.; Li, F.; Liang, W.; Feng, S.; Wu, M. Y. A Near-Infrared Biothiol-Specific Fluorescent Probe for Cancer Cell Recognition. *Analyst* **2019**, *144* (16), 4750–4756. https://doi.org/10.1039/c9an00795d.

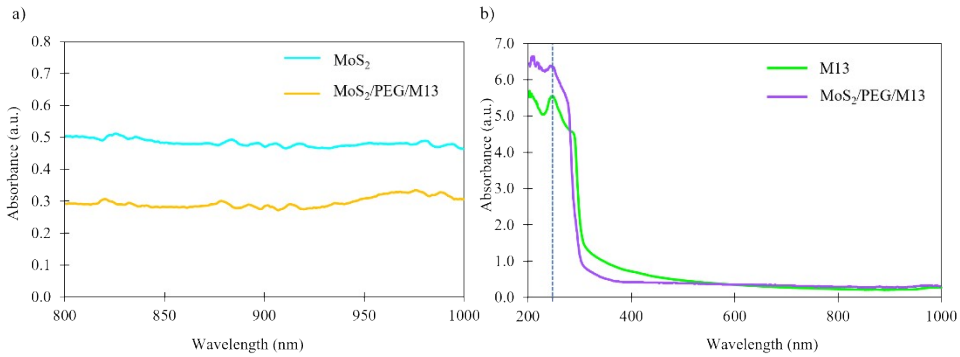

Figure S1. UV-Vis absorbance spectra of the MoS_2, M13 and MoS_2/PEG/M13 samples.

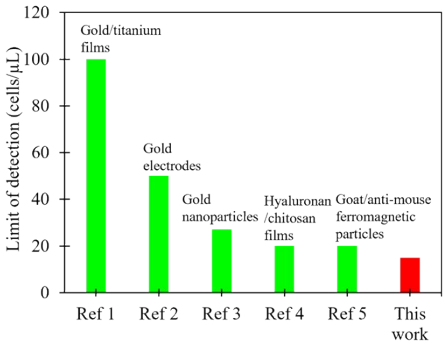

Figure S2. Comparison of the limit of detection (cells/μL) of the MoS_2/PEG/M13 cancer cell AC-pulse sensor system with that of current sensing methods with medium cell populations. The information of the references can be found in Supporting Table S1.

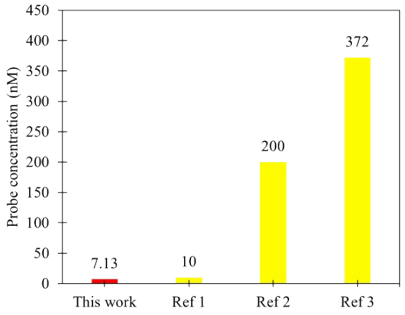

Figure S3. Comparison of probe concentration of MoS_2/PEG/M13 cancer cell AC-pulse sensor system with that of current sensing methods with medium cell populations. The information of the references can be found in Table S2.