Electronic Supplementary Material (ESI) for Nanoscale Advances.

Supplementary Information

MoS_2-MWCNT based Fluorometric Nanosensor for Exosome Detection and Quantification

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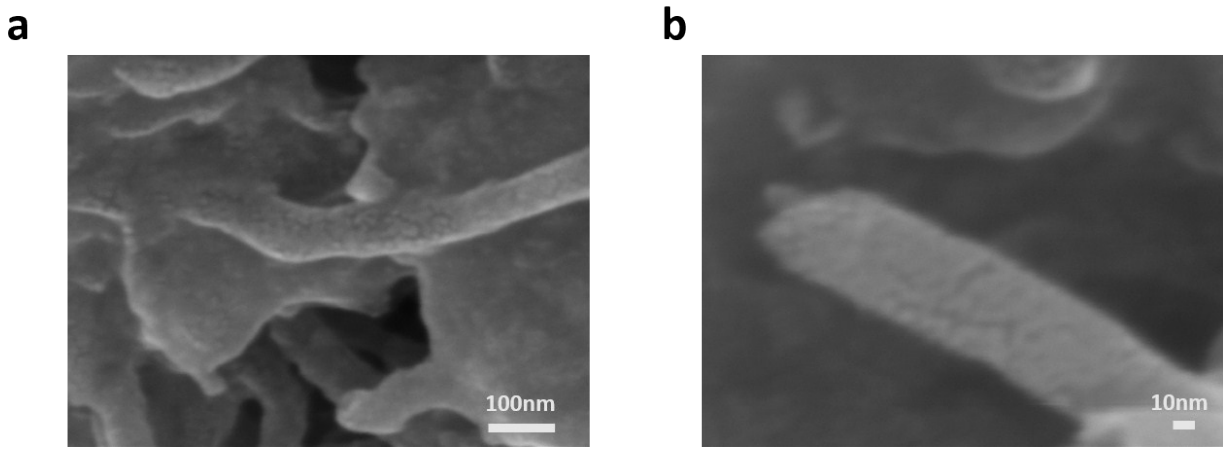

Fig. S1 Scanning electron microscopy of MoS_2-MWCNT with different magnification in (a) and (b).

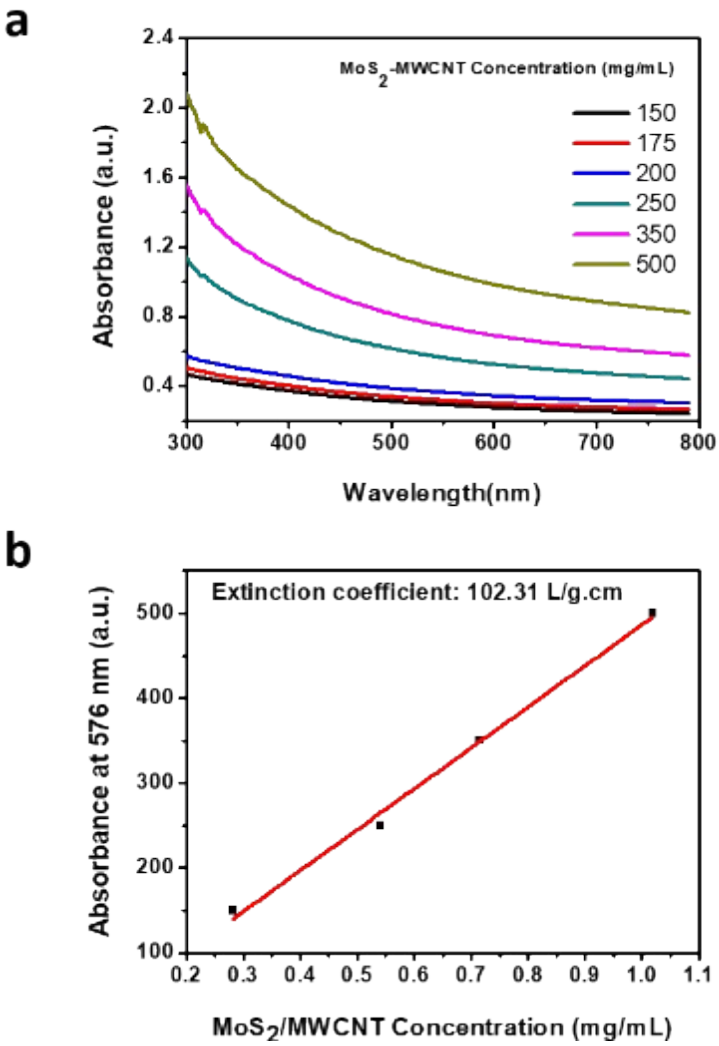

Fig. S2 Absorbance of different concentrations of MoS_2-MWCNT with a broad absorption band from UV to NIR region, which is a good candidate for PE (R-phycoerythrin) with emission wavelength of 575 nm.

Table S1.

The parameters of general nonlinear Stern-Volmer model for fluorescence quenching of anti-CD63-PE in the presence of MoS_2-MWCNT as a quencher

K_S (mL/mg)	K_D (mL/mg)	f	n	R^2
7.724×10^{-8}	0.02743	0.9903	3.474	0.9852

Table S2

Comparison of the Limit of Detection (LOD) and Detection Time of Different Methods for Exosome Determination

Detection Method	Purification Method	Detection Time	Limit of Detection	Method Limitation	Reference
Anodic stripping voltammetric quantification	Total exosome isolation reagent and CD63 antibody-functionalised magnetic beads	>1hr	10^5 exosomes/mL	Not given	[1]
Aptamer based electrochemical biosensor	ExoQuick-TC exosome precipitation reagent	83 min	10^6 exosomes/mL	Not given	[2]
Colorimetric (mimicking peroxidase ability of single-wall carbon nanotubes)	Ultracentrifugation	40 min	5.2×10^8 exosomes/mL	Susceptible to interference due to developing a “signal-on” strategy to replace “signal-off” strategy	[3]
Electrochemical	Total exosome isolation reagent	60 min	4.7×10^8 exosomes/mL	Not given	[4]
Nanostructured herringbone chip combined with a sandwich exosome enzyme-linked immunosorbent assay (ELISA)	Exosome capture on the antibody modified chips/ ultracentrifugation	-	10^4 exosomes/mL	Limited preparative sample processing capacity for bulk exosomal content analysis	[5]
Microfluidic and fluorescence	immobilizing vesicles in a microfluidic device (ExoChip)	70 min	0.5 pM	Not given	[6]
Electrochemical sandwich immunosensor	Ultracentrifugation	60 min	2×10^5 exosomes/mL	Long incubation times and multi-steps process	[7]
Fluorescence	Total exosome isolation reagent	60 min	14.8×10^5 exosomes/mL	Susceptible to influence from nonspecific interactions of antibodies	This work

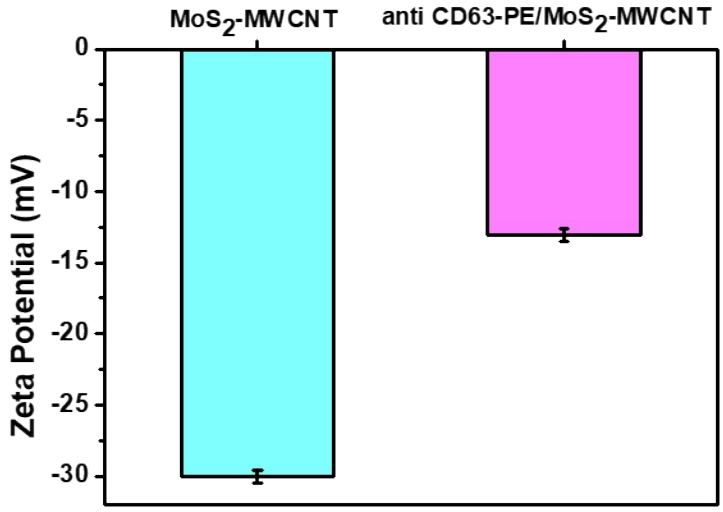

Fig. S3 Zeta potential of MoS_2-MWCNT nanocomposites (a) before and (b) after adding anti CD63-PE, which shows a significant decrease in the zeta potential value and confirms the adsorption of anti CD63-PE on MoS_2-MWCNT.

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