Supporting Information for

Targeted fluorescence imaging enhanced by 2D materials: A comparison between 2D MoS_2 and graphene oxide

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Additional figures

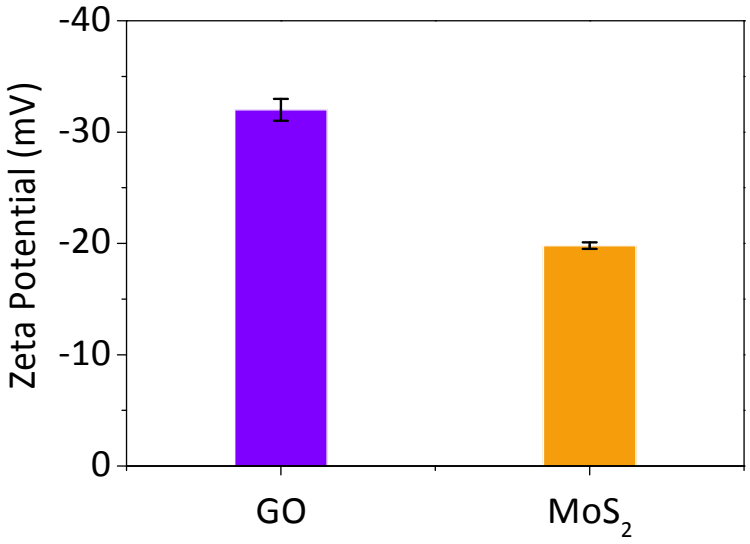

Figure S1. Dynamic light scattering (DLS) of graphene oxide (50 µg mL^{-1}) and 2D MoS_2 (50 µg mL^{-1}) in Tris-HCl (0.01 M, pH 7.4) carried out on a Horiba LB-550 DLS Nano-Analyzer.

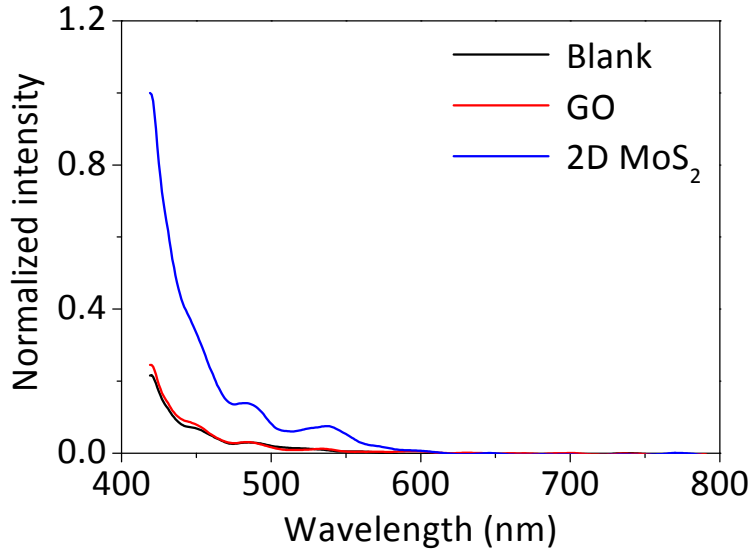

Figure S2. Fluorescence spectroscopy of graphene oxide (50 µg mL^{-1}) and 2D MoS_2 (50 µg mL^{-1}) in Tris-HCl (0.01 M, pH 7.4) carried out on a Varian Cary Eclipsefluorescence spectrophotometer with excitation of 400 nm (use of other excitation wavelengths including 325, 350 and 460 nm did not produce any emission of the two materials; data not shown).

Experimental section

Preparation of 2D thin-layer MoS_2. Layered MoS_2 was obtained through sonication-assisted exfoliation of bulk MoS_2 crystals in the mixed aqueous solution of EtOH and water. MoS_2 (100 mg, Aladdin Reagent Inc.) was added to a 25 mL vial filled with 20 mL of EtOH/water (1:1, v/v). The sealed vial was sonicated for 8 h, and then the dispersion was centrifuged at 3200 rpm for 10 mins to remove aggregates. After collecting the supernatant and drying at 60 ℃ in a drying oven, an army green powder was obtained. The obtained podwer was dissolved in Milli-Q ultrapure water and sonicated for 0.5 h to provide a homogeneous stock solution.

Scanning electron microscope (SEM). A droplet of 2D MoS_2 (0.1 mg mL^{-1}) or GO (0.1 mg mL^{-1}) was cast onto a freshly cleaved mica surface, followed by drying at room temperature. Then, SEM of the materials was carried out with S-3400N (HITACHI, Japan).

High-Resolution Transmission electron microscope (HRTEM). A droplet of MoS_2 (0.1 mg mL^{-1}) or GO (0.1 mg mL^{-1}) was cast onto 200 mesh holey carbon copper grids for HRTEM characterizations. JEOL 2100 equipped with a Gatan Orius charged-coupled device camera and Tridiem energy filter operating at 200 kV was used for the images. The obtained data were processed using Image J software.

Raman spectroscopy. Raman spectra were obtained using a Renishaw InVia Reflex Raman system (Renishaw plc, Wotton-under-Edge, UK) employing a grating spectrometer with a Peltier-cooled charge-coupled device (CCD) detector coupled to a confocal microscope. The data obtained were processed with Renishaw WiRE 3.2 software. The Raman scattering was excited by an argon ion laser (I = 514.5 nm).

Real-time quantitative PCR. Total RNA was isolated from cells and tissues using TRIzol Reagent (Invitrogen) according to the manufacturer's protocol. Complementary DNA generated using a PrimeScript® RT reagent kit (TaKaRa, Dalian, China) was analyzed by quantitative PCR using SYBR® Premix Ex TaqTM. Real-time PCR was performed using a 7300 Real-Time PCR system (Applied Biosystems, CA, USA). GAPDH was detected as the housekeeping gene. Primers for qPCR were as follows:

GAPDH forward, 5'-ATCACTGCCACCCAGAAGAC-3'
and reverse, 5'-ATGAGGTCCACCACCCTGTT-3'
ASGPR1 forward, 5'-CTGGACAATGAGGAGAGTGAC-3'
and reverse, 5'-TTGAAGCCCGTCTCGTAGTC-3'

Fluorescence imaging of cells. Cells (15×10^4) were seeded on a black 96-well microplate with optically clear bottom (Greiner bio-one, Germany) overnight. Then the cells were incubated with **DK1** in the absence and presence of a material (GO or 2D MoS_2) for 15 min**.** Then, cells were gently washed with PBS three times, fixed using 4% paraformaldehyde and stained with Hoechst (5 μg mL^{-1}). The fluorescence images were recorded using an Operetta high content imaging system and quantified by the Columbus image data analysis system (Perkinelmer, US).

Fluorescence imaging of tissues. The xenograft, spleen and lung sections removed from Hep-G2-bearing xenograft mice (see: *J. Mater. Chem. B*, 2015, **3**, 9182) were fixed in 4% paraformaldehyde in PBS overnight. Sections (12 μm) were cut using a rotary microtome, and then treated with PBS for 10 min. Then, the sections were incubated with **DK1** (10 μM) with or without 2D MoS_2 and GO (100, 250 or 500 μg mL^{-1}) for 15 min, and were gently washed with PBS three times and mounted by glycerin. The fluorescence images were recorded using a fluorescence microscope (Olympus, Japan).