Supplementary Material (ESI) for Chemical Communications

Supporting Information

Using Graphene to Protect DNA from Cleavage during Cellular Delivery

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Experimental

1. Synthesis of NGO-PEG

The functionalized nanoscale graphene oxide (NGO) was synthesized according to the report of Dai and coworkers.[1,2] At first, graphene oxide was synthesized from natural graphite powder by a modified Hummers method.[3] Exfoliation was carried out by sonicating 1 mg/mL graphene oxide dispersion under ambient condition for 4 hours. 10 mL of above solution was mixed with 10 ml of 3M NaOH, and the mixture solution was sonicated for 4 hours. After sonication, the solution was neutralized with HCl, and the product was filtered and rinsed. In order to gain NGO, the modified graphene oxide was then bath-sonicated with 2 mg/ml of polyethylene glycol (PEG) for 10 minutes. *N*-(3-dimethylaminopropyl-*N*'-ethylcarbodiimide) hydrochloride (EDC) was added to reach 5 mM and the solution was bath sonicated for another 30 minutes and finally stirring for another 12 hours. The reaction was quenched by mercaptoethanol. The final product (NGO) was ultracentrifuged at 36000 g in deionized water for 2 h and the supernatant was saved.

2. Cell culture and particle incubation.

In order to explore the potential application of NGO as biomolecule carriers, the HeLa cells were treated by following steps. Briefly, the Hela cells were grown on

glass coverslips placed at the bottom of 6 well tissue culture plates. After 12 hours, the media was discarded. New media containing MB/NGO complex was added. The MB/NGO complex was then incubated with Hela cells at a final concentration of 20 mg/L (MB concentration was 50 nM) for 6 hours. After 6 hours treatment, the media was replaced, and the cells were cultured for another 8 hours. Finally, the coverslips were removed from the wells, washed with PBS buffer, and detected by the confocal microscopy by fixed on a glass slide.

Supporting Figures

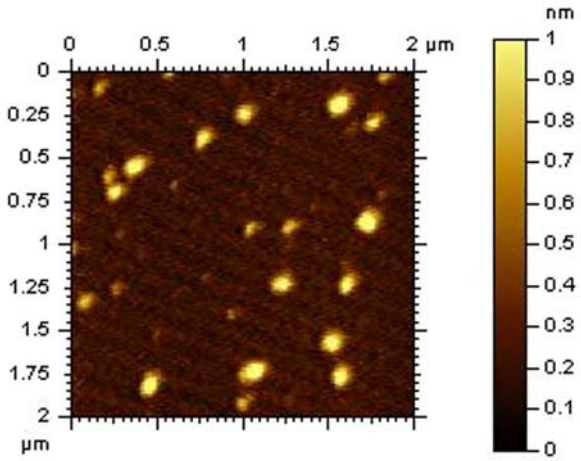

Fig. S1 AFM image of the prepared NGO. A droplet of NGO dispersion (about 0.01 mg/mL) was cast onto a freshly cleaved mica surface, followed by drying at room temperature.

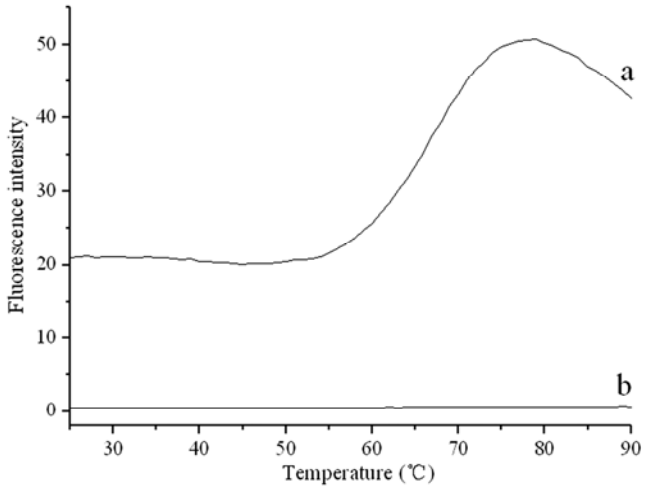

Fig. S2 Fluorescence emission spectra of MB (50 nM) at different conditions: a) MB in Tris-HCl buffer; b) MB+NGO; and c) MB+NGO +(300 nM) target DNA.

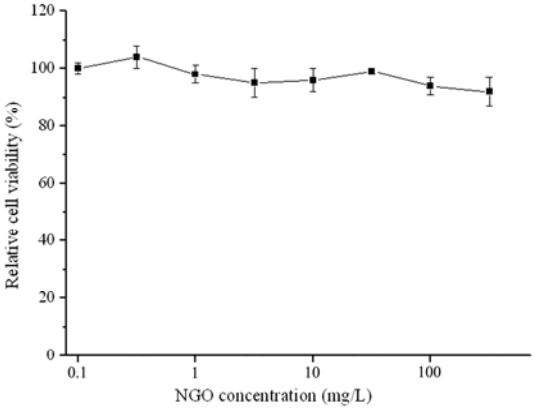

Fig. S3 Relative cell viability data of Hela cell after incubation with NGO at different concentrations.

References:

1 X. M. Sun, Z. Liu, K. Welsher, J. T. Robinson, A. Goodwin, S. Zaric and H. J. Dai, *Nano Res.*, 2008, **1**, 203.

2 Z. Liu, J. T. Robinson, X. M. Sun and H. J. Dai, *J. Am. Chem. Soc.***,** 2008, **130,** 10876.

3 W. S. Hummers and R. E. Offeman, *J. Am. Chem. Soc.*, 1958, **80**, 1339.