Electronic supplementary information (ESI)

Fluorescent miRNA analysis enhanced by mesopore effects of polydopamine nanoquenchers

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Particle characterizations.

Transmission electron microscope (TEM) images were obtained by a JEM 2010 (JEOL, Japan) instrument with 200 KV acceleration voltages. Samples were dried on carbon-coated Cu grids.

Nitrogen sorption isotherms were measured with a ASAP2010 analyzer (Micromeritcs, USA). The specific surface areas were calculated by the Brunauer-Emmett-Teller (BET) method in a linear relative pressure range between 0.05 and 0.25. The pore size distributions were derived from the desorption branches of the isotherms by the NLDFT method.

The hydrodynamic size distributions and zeta potentials of the samples were measured using dynamic light scattering (DLS) techniques by a Zetasizer Nano instrument (Malvern, UK) at 25 °C.

The fluorescence emission of the FAM labeled oligonucleotides was measured by using a fluorescence spectrophotometer (RF-6000, Shimadzu).

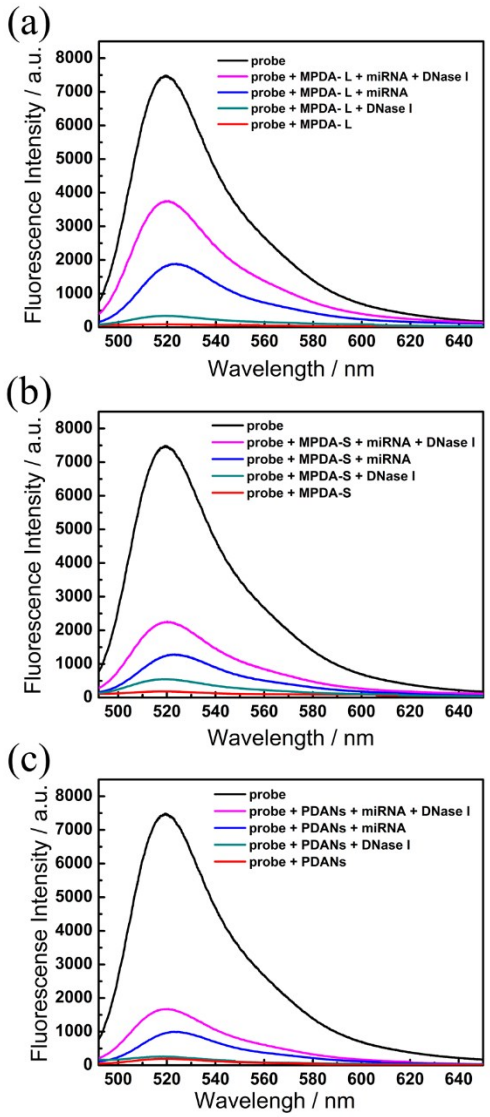

Fig. S1 Comparison in the fluorescence spectra of probe DNA solution in the detection buffer (20 mM Tris-HCl with 140 mM NaCl, 5 mM KCl, 1 mM $MgCl_2$ and 1 mM $CaCl_2$, pH 7.4) upon the addition of 90 μg mL^{-1} nanoparticle quenchers (MPDA-L, a; MPDA-S, b; PDANs, c), DNase I, and miRNA.

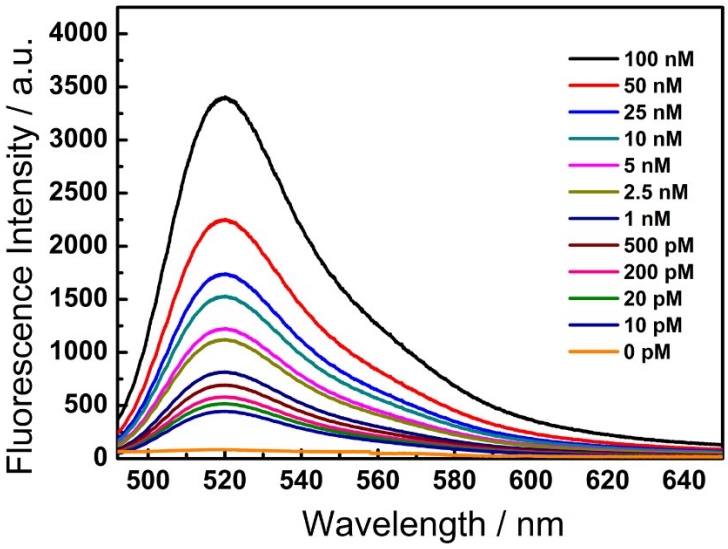

Fig. S2 Fluorescence spectra upon the addition of DNase I and different concentrations of miRNA-21 in the suspension of probe/MPDA-L complex.

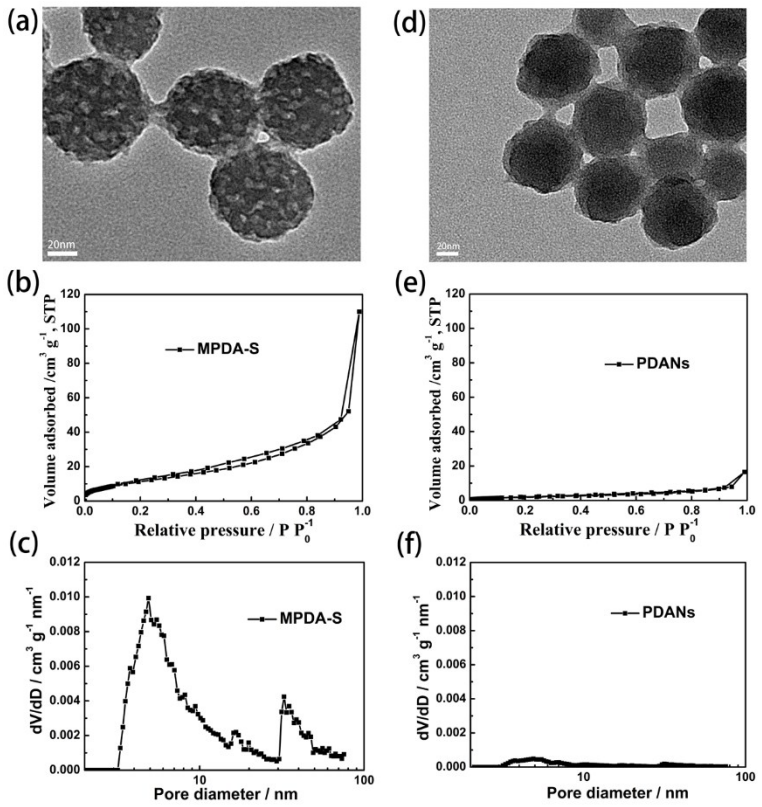

Fig. S3 Characterizations of MPDA-S and PDANs: TEM images (a and d); nitrogen sorption isotherms (b and e); pore size distributions derived from the desorption branches of the corresponding nitrogen sorption isotherms (c and f).

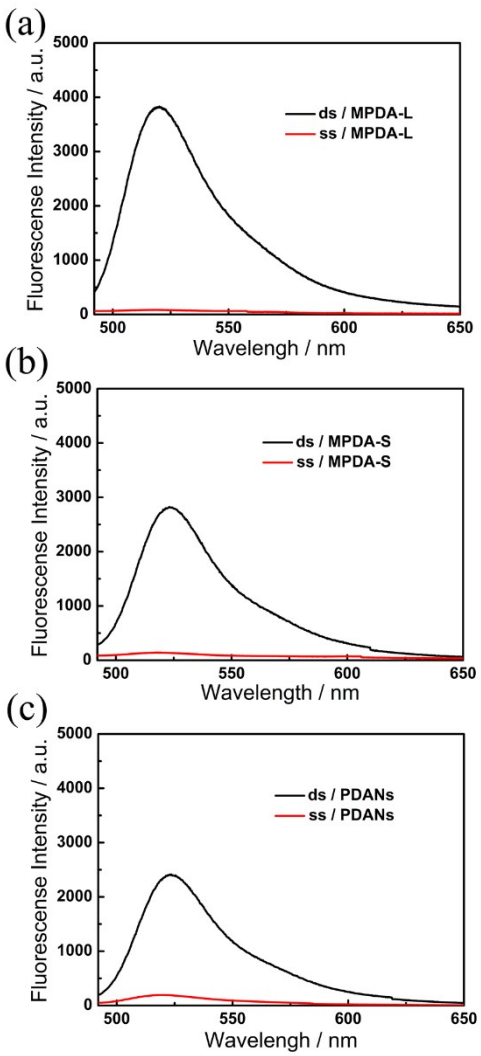

Fig. S4 Comparison in the fluorescence emission spectra of double strand (ds) heteroduplex and single strand (ss) DNA probe in the absence and the presence of three nanoparticles (MPDA-L, a; MPDA-S, b; PDANs, c) after the incubation time in the probe loading procedure (30 min).

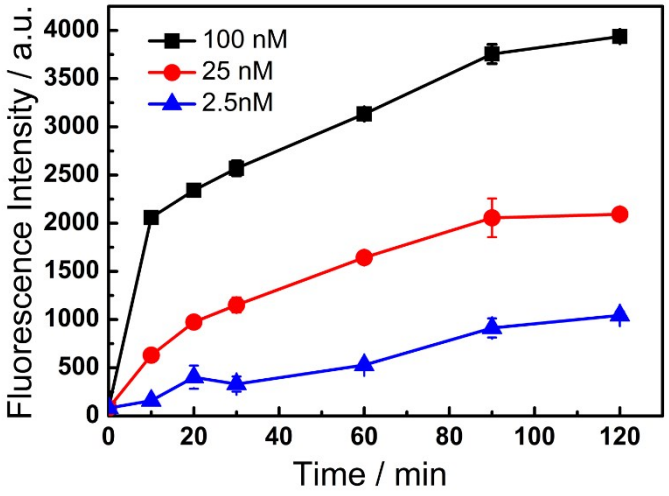

Fig. S5 Fluorescence recovery kinetics of 50 nM probe (for let-7a) loaded MPDA-L suspensions with response to the addition of let-7a miRNA with varying concentrations (2.5, 25 and 100 μM).

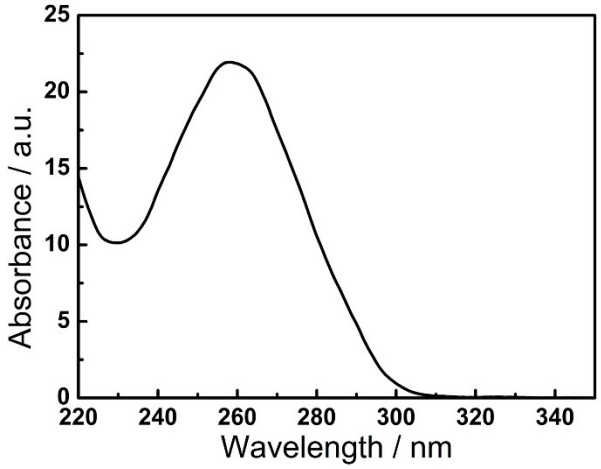

Fig. S6 UV-vis absorption spectrum of total RNA samples extracted from LO2 cells. The A260/280 value of the sample was 2.05, indicating the high purity of RNAs by the extraction process.

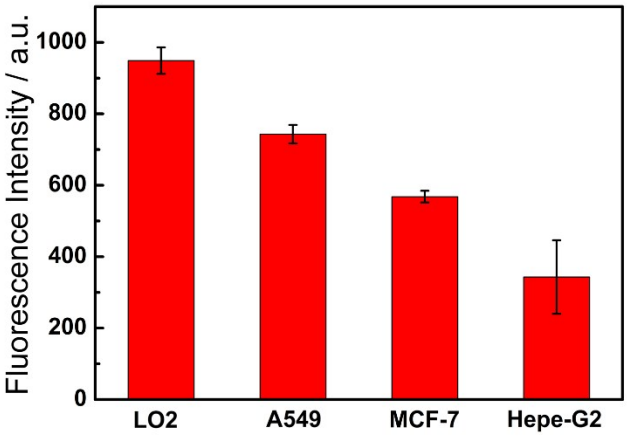

Fig. S7 Comparison in the fluorescence intensities for the detection of let-7a miRNA in total RNA samples at the highest concentration of cells (5×10^7).