Supplementary Material (ESI) for Lab on Chip

Supporting Information

Quick Genotyping Detection of HBV by Giant Magnetoresistive Biochip combined with PCR and Line Probe Assay

*Xiao Zhi, Qingsheng Liu, Xin Zhang, Yixia Zhang, Jie Feng, Daxiang Cui**

Experimental

Preparation of functionalization of magnetic nanocluster

0.1 M $FeCl_3 \bullet 6H_2O$, 0.001 M citric acid and 0.05M polyvinyl alcohol (PVA) were completely dissolved in 35 mL ethylene glycol by the aid of ultrasonication. The solution was sealed in a 50 mL Teflon lined stainless-steel autoclave and then heated at 200 °C for 10 h. After cooling down to the room temperature, the black sediment was separated magnetically and washed with ethanol and deionized water for 3 times respectively to eliminate organic and inorganic impurities, and then dried in a vacuum at 60 °C. A JEOL2010 transmission electron microscope (TEM) and JEOL scanning electron microscope (SEM) were used for taking images of MNCs. X-Ray diffraction (XRD) was used to confirm the crystalline phase of MNCs. Fourier transform infrared (FTIR) spectra were obtained using a PerkinElmer spectrum 100 to testify the adsorption of carboxyl groups on the MNCs surface. The mass fraction of magnetite in MNCs powder was determined by a Mettler Toledo TGA/DSC 1/1600 theromgravimetric analyzer, by heating MNCs powders from 30 °C to 1000 °C at 10 °C/min under nitrogen flow. Magnetization of MNCs powders was carried out on a Lakeshore 7300 vibration sample magnetometer (VSM).

Coupling of magnetic nanocluster with streptavidin

20 mL of 1 mg/mL MNCs and 20 mL of 1 mg/mL streptavidin were mixed respectively, and then 2 mL 1 mg/mL EDC were added and blended by pipetting up and down. Meanwhile, 2 mL de-ionized water was taken as control of coupling. The resulting solution reacted at the room temperature for 3 h with continuous mixing in roller mixer and then separated magnetically. BSA was added into the solution at a concentration of 1 mg/mL and incubated at the room temperature for 3 h. The streptavidin-labelled MNCs were then separated magnetically and the supernatant was discarded. 20 mL PBS [Phosphate-Buffered Saline (PBS); 0.2 mg/mL KCl, 1.44 mg/mL Na_2HPO_4 , 0.24 mg/mL KH_2PO_4 , 8 mg/mL NaCl, pH 7.4] with 0.5 % tween-20 (v/v) and 1 % BSA was used to resuspend and wash streptavidin-labeled MNCs for 3 times. The streptavidin-labelled MNCs were finally dispersed in 20 mL PBS with 0.5 % tween-20 (v/v) and 0.5 % BSA and kept at 4℃until use.

Results

Figure S1. Characterization of MNCs synthesized in one-pot manner: (A) TEM; (B) HRTEM; (C) SEM; (D) XRD diffraction patterns.

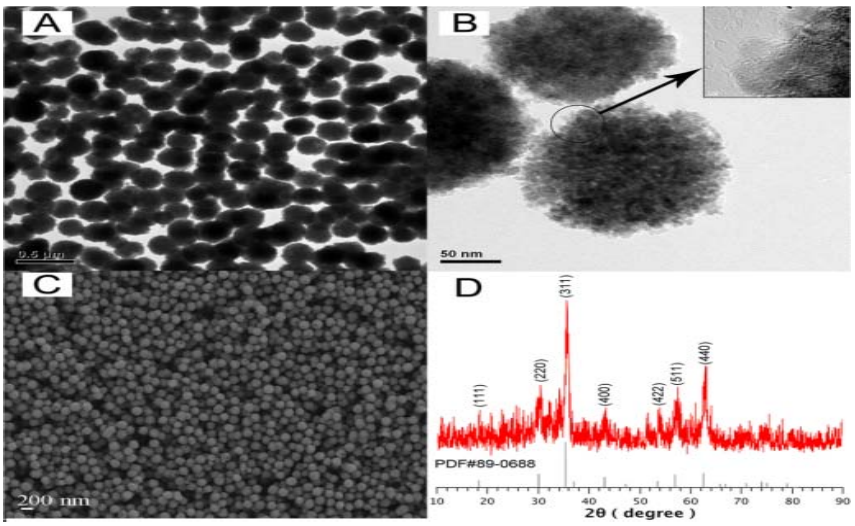

Figure S2. Characterization of functional groups of MNCs: (A) FT-IR spectra of MNCs; (B) Thermogravimetric curves of MNCs.

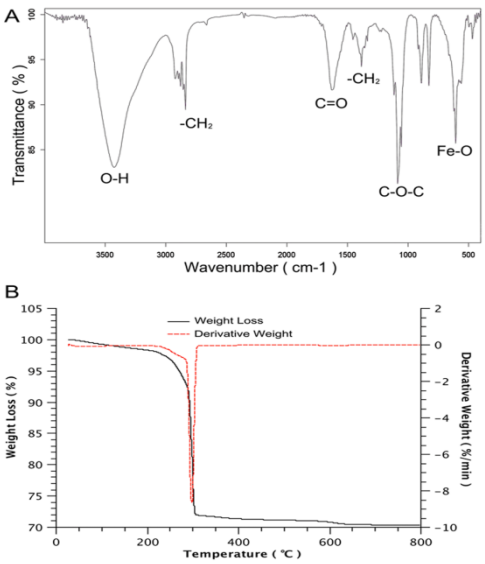

Figure S3. Magnetization curves of CMNCs powders measured at 300 K.