

Direct preparation of PNIPAM coating gold nanoparticles by catechol redox and surface adhesion chemistry

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Materials. Dopamine hydrochloride, borax ($\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$), 2-bromopropionyl chloride, $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$, copper (I) chloride (CuCl), *N*-isopropylacrylamide (NIPAM), pyrene, magnesium sulfate (MgSO_4), hydrochloric acid (HCl) and sodium hydroxide (NaOH) were all purchased from Aldrich and used as received. All organic solvents dimethylformamide (DMF), tetrahydrofuran (THF), methanol (MeOH), ethyl acetate (EtAc), ethanol (EtOH), diethylether and chloroform (CHCl_3) were purchased from Scharlau. Hydrogen tetrachloroaurate (III) ($\text{HAuCl}_4 \cdot 4 \text{H}_2\text{O}$) was obtained from Alfa Aesar. A literature method was followed to prepare tris[2-(dimethylamino)ethyl]amine (Me_6TREN).^[1]

Measurements and equipments. Scanning electron microscopy (SEM) measurements were performed using a field emission scanning electron microscope (FE-SEM) (Hitachi, SU 8000, Japan) at 5 kV in transmitted electron imaging mode. Transmission electron microscopy (TEM) measurements were performed using STEM Zeiss 910 equipment. The samples were observed at a voltage of 80 kV. To prepare the SEM/TEM samples a dispersion of Au@PNIPAMx nanoparticles in water was dropped onto a carbon-coated copper grid. The Fourier transform infrared (FTIR) spectra of KBr pellets were recorded using a Perkin Elmer Spectrum 2000 FTIR spectrometer

incorporating a deuterated triglycine sulphide (DTGS) detector and an extended range KBr beam splitter. The hydrodynamic diameter of each nanoparticle sample in solution was determined by dynamic light scattering (DLS) measurements using Malvern Zetasizer Nano ZS series equipment, the different samples were equilibrated for two hours at each temperature. Nanoparticle dispersions were left to equilibrate for 5 minutes before the measurements. UV-Vis-NIR spectra were recorded in a Perkin Elmer Lambda 16 spectrophotometer, the different samples were equilibrated for two hours at each temperature. Raman measurements were undertaken in a Renishaw InVia Reflex Raman system (Renishaw plc, Wotton-under-Edge, UK) employing a grating spectrometer with a 1200l/mm Peltier-cooled charge-coupled device (CCD) detector. All spectra were processed using Renishaw WiRE 3.3 software. The Raman scattering was excited using a diode laser at a wavelength of 785 nm. The laser beam was focused on the sample with a microscope objective ($f=30\text{mm}$) with a laser power of 320 mW. The exposure and number of accumulations for the Raman measurements were 10 seconds and 10 times respectively. The cells used were quartz cuvettes with a light path of 10×4 mm. Proton nuclear magnetic resonance ($^1\text{H-NMR}$) spectra were performed in a Bruker NMR spectrometer at $25.0\text{ }^\circ\text{C}$.

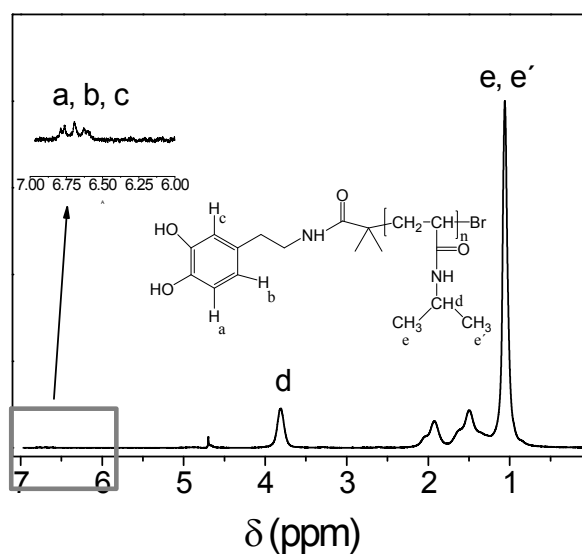


Figure S1. $^1\text{H-NMR}$ spectrum of catechol-PNIPAM in D_2O .

1 M. Ciampolini and N. Nardi, *Inorganic Chemistry*, 1966, **5**, 41-44.