Animmunomagnetic separation based fluorescence immunoassay for rapid myoglobin quantification in human blood

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Carboxylation of APTES



Scheme 1S. The synthesis of APTS-COOH

1.96 g (20 mmole) maleic anhydride was added to 20 mL ether in a flask, then 3.4 mL (20 mmole) APTES was added into the flask drop by drop, keep stirring at 4 °C for 1h, finally the white solid was collected by vacuum distil.

FT-IR spectroscopy of SNP@Rh X and MNP@SiO2@Au



Figure 1S. FT-IR spectroscopy of SNPs and SNP@Rh X

FT-IR spectroscopy was performed to confirm the surface chemistry of SiO₂ nanoparticles in the range of 4000-500 cm⁻¹. The main absorption bands associated with Si-O and Si-O-Si bending were observed at 790 cm⁻¹ and 470 cm⁻¹, respectively. And another characteristic signal 1105cm⁻¹ was attributed to Si-O-Si asymmetric vibration, while the absorption peak at 1630cm⁻¹ was consistent with stretching of solvent hydroxyl. In contrast the band at 1400 cm⁻¹ was attributed to - CH- bending, the absorption band appeared at 1850cm⁻¹ was assigned to the asymmetric vibration of open chain anhydride, which suggested that carboxyl group have been anchored on the surface of SiO₂ nanoparticles.

MNPs MNP@SiO2@BSA@Au 140 Transmittance(%) 1850

1620

Figure 2S. FT-IR spectroscopy of MNPs and MNP@SiO2@BSA@Au

1100

1500

FT-IR spectroscopy of MNP@SiO2@BSA@Au

The band appeared at 460cm⁻¹,795cm⁻¹ and 1100cm⁻¹ was the characteristic signal of Si-O-Si bending,Si-O bending and Si-O-Si asymmetric vibration,respectively, which suggested the SiO2 have been coated on the surface of Fe₃O₄.

2000 2500

Wavenumber(cm⁻¹)

2920

3380

3500

4000

4500

3000

Hydrodynamic diameters measurment

1000

500

0

Sample	Fe ₃ O ₄	Fe ₃ O ₄ @SiO ₂	Fe ₃ O ₄ @SiO ₂ @BSA	Fe ₃ O ₄ @SiO ₂ @BSA@Au
Size (nm)	158.2	186.4	225.6	292.3
PDI	0.096	0.105	0.144	0.218

Table 1S. The DLS results of each of step in Fe₃O₄@SiO₂@BSA@Au synthesis



Figure3S. DLS result of Fe₃O₄nanoparticles



Figure 4S. DLS result of Fe_3O_4 (2) BiO_2



Figure 5S. DLS result of Fe₃O₄@SiO₂@BSA



Figure 6S. DLS result of Fe₃O₄@SiO₂@BSA@Au

The stability of SNP@Rh nanoparticles and MNP@SiO₂@BSA@Au nanocomposites in PB(10 mM, pH 7.4)

Table 2S. The DLS result of SNP@Rh, SNP@Rh@antibody, MNP@SiO₂@BSA@Au and MNP@SiO₂@BSA@Au@antibody in 35 days

Sample	SNP@Rh		SNP@Rh@antibody		MNP@SiO2@BSA@ Au		MNP@SiO2@BSA@ Au@antibody	
days	Size(nm)	PDI	Size(nm)	PDI	Size(nm)	PDI	Size(nm)	PDI
0	104.3	0.112	120.8	0.154	292.3	0.204	314.8	0.235
7	103.7	0.132	125.7	0.184	298.6	0.228	325.7	0.256
14	108.7	0.105	128.7	0.168	284.2	0.254	330.5	0.267
21	105.9	0.122	129.4	0.158	289.1	0.213	321.2	0.274
28	104.9	0.143	130.2	0.177	295.3	0.269	329.1	0.259
35	107.4	0.129	132.8	0.189	299.5	0.258	330.6	0.264

Reproducibility of the MNP@SiO₂@BSA@Au nanocomposites and SNP@Rhx nanoparticles based sandwich assay

Table 3S.	The result of 5	times test at	different c	concentration	of myog	lobin

Concentration	s 0	1	10	50	100	250			
(ng/mI	.)								
			Floresce	Florescence intensity					
1	2.94	7.35	17.58	84.56	260.14	580.42			
2	2.85	7.68	16.84	80.43	255.31	594.74			
3	3.05	7.06	18.89	78.96	268.94	588.48			
4	2.83	7.56	17.93	89.49	251.19	572.14			
5	2.88	7.95	16.35	86.59	267.43	579.61			
RSD(%)	3.04	4.47	5.62	5.16	2.93	1.49			