Supporting Information

Methyl methacrylate-modified polystyrene microspheres: An effective strategy to enhance the fluorescence of Eu-complexes

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Table S1 Different ratios of St and MMA

St (g)	MMA(g)	H_2O (mL)	APS (g)	SDS (g)
4.5	0.5	45	0.20	0.25
3.5	1.5	45	0.20	0.25
2.5	2.5	45	0.20	0.25
3.5	1.5	45	0.20	0.25

Table S2 Microspheres with different sodium methacrylate contents

St (g)	MMA (g)	H_2O (mL)	APS (g)	Sodium methacrylate	SDS (g)
3.5	1.5	45	0.20	1%mol	0.25
3.5	1.5	45	0.20	2%mol	0.25
3.5	1.5	45	0.20	3%mol	0.25
3.5	1.5	45	0.20	4%mol	0.25

Table S3 Analysis data comparison among PS-Eu, PSMMA-Eu and commercial microspheres

Samples	m_0 (g)	V_0 (mL)	Test Elements	Element concentration of test solution (mg/L)	Sample element content (mg/kg)	W (%)
PSMMA-Eu	0.0559	50	P	0.646	578.10	0.06
	0.0559	50	P	0.639	571.30	0.06
	0.0559	50	Eu	6.602	5905.89	0.59
	0.0559	50	Eu	6.611	5914.12	0.59
PS-Eu	0.0548	50	P	0.320	292.28	0.03
	0.0548	50	P	0.340	309.80	0.03
	0.0548	50	Eu	0.841	767.20	0.08
	0.0548	50	Eu	0.855	780.33	0.08
Commercial microspheres	0.0551	50	P	0.046	41.17	0.004
	0.0551	50	P	0.047	422.03	0.004
	0.0551	50	Eu	1.582	1342.02	0.13
	0.0551	50	Eu	1.564	1399.46	0.14

Table S4 Quantitative detection of LFIAs based on PSMMA- Eu

Samples	ng/mL	T	T-AV	C	C-AV	T/C	T/C-AV	T/C-CV
PSMMA-Eu	0	27180	28088	28976	29626	0.9380	0.947	1.33%
		25686		27551		0.9323		
		26575		27833		0.9548		
		29647		31385		0.9446		
		31352		32388		0.9680		
	0.5	14143	13635	34374	34957	0.4114	0.390	8.62%
		12480		31396		0.3975		
		12177		32916		0.3699		
		16605		38817		0.4272		
		12768		37227		0.3430		
	1	7972	9114	34892	37832	0.2285	0.240	5.37%
		11017		42104		0.2617		
		8329		34448		0.2418		
		8795		37044		0.2374		
		9456		40673		0.2325		
	5	3902	3945	37921	42425	0.0982	0.093	7.46%
		3719		39770		0.0934		
		3898		45284		0.0861		
		3554		41366		0.0859		
		4653		45984		0.1012		
	10	2890	2786	52377	46504	0.0552	0.060	6.84%
		2942		44204		0.0666		
		2841		47490		0.0598		
		2635		43929		0.0600		
		2621		44519		0.0589		
	20	2165	1809	48036	44943	0.0451	0.040	7.16%
		1995		49950		0.0399		
		1567		39560		0.0396		
		1806		47348		0.0381		
		1514		39819		0.0380		
	50	906	991	47946	46341	0.0189	0.021	15.96%
		839		44174		0.0190		
		1296		48706		0.0266		
		896		46603		0.0192		
		1016		44277		0.0230		
	100	553	619	49670	49621	0.111	0.013	8.81%
		668		48189		0.0139		
		614		45870		0.0134		
		664		55189		0.0120		
		598		49189		0.0121		

Table S5 Comparison between the detection limits (LODs) of LFIAs (lateral flow immunoassay) based on fluorescent PSMMA-Eu and commercial microspheres.

Method	LOD (ng/ mL)
LFIA based on fluorescent PSMMA-Eu	0.10
LFIA based on commercial microspheres	1.00

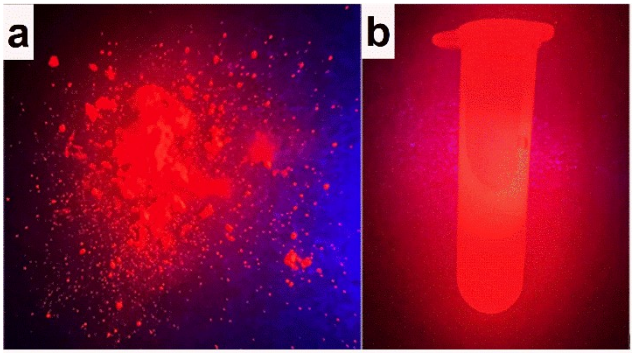

Fig. S1 Photographs of (a) Eu $(TTA)_3(TPPO)_2$ and (b) PSMMA-Eu under 365nm irradiation.

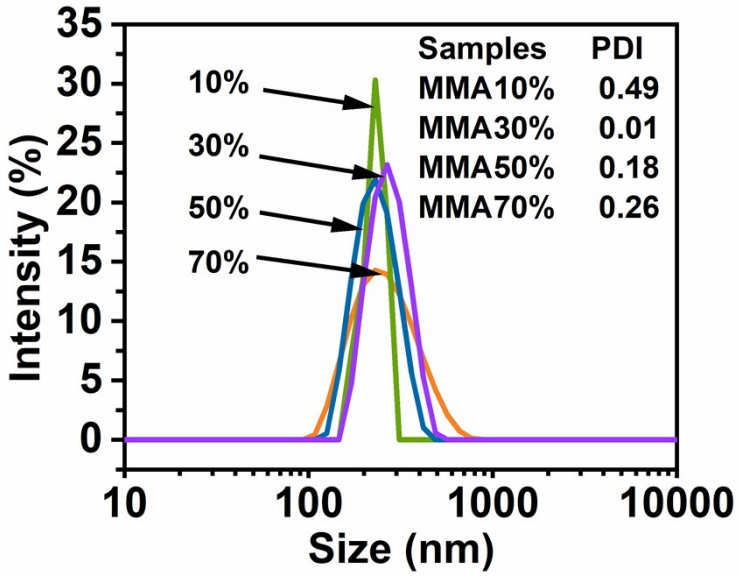

Fig. S2 DLS images of PSMMA-Eu microsphere with different ratios of MMA

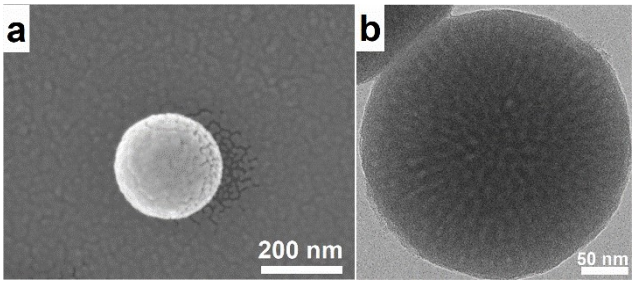

Fig. S3 Enlarged SEM(a) and HRTEM(b) of a single fluorescent microsphere of PSMMA

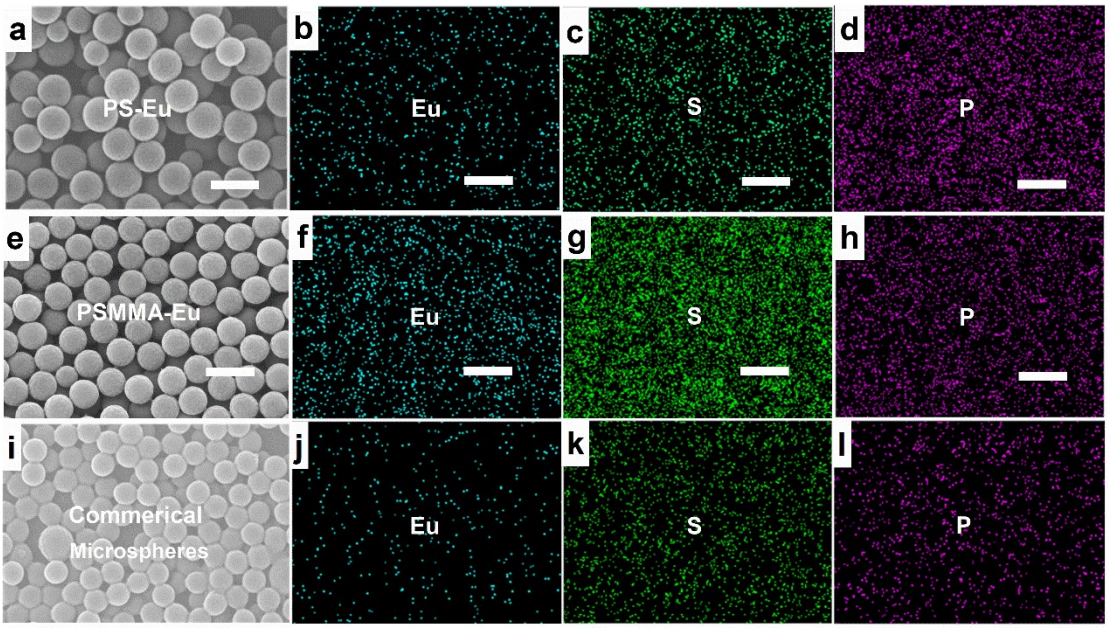

Fig. S4 Element distribution scanning map of PS-Eu(a)-d), PAMMA-Eu(e-h) and commercial microspheres (i-l) (Scale bar = 500nm)

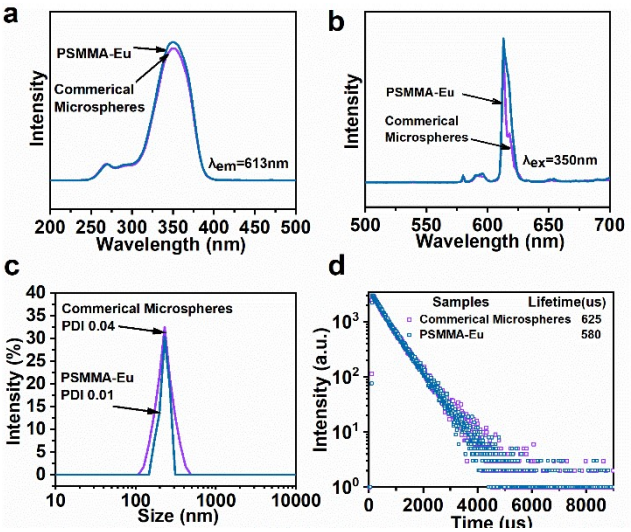

Fig. S5 (a-b) Emission and excitation spectra, (c) DLS images and (d) Fluorescence attenuation spectra of PSMMA-Eu and commercial microspheres.