Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.
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Supporting information

Table S1. Zeta-potential results of four functionalized magnetic nanoparticles.

Magnetic nanoparticles	Zeta potential (mV)
Fe_3O_4@SiO_2@$(HA/CS)_{10}$	+4.86
Fe_3O_4@SiO_2@$(HA/CS)_{10}$-NH_2	+17.4
Fe_3O_4@SiO_2@$(HA/CS)_{10}$-PO_3^{2-}	-22.5
Fe_3O_4@SiO_2@$(HA/CS)_{10}$-Ti^{4+}	+14.6

Table S2. List of phosphopeptides identified from tryptic digest of β-casein after enriched by Fe_3O_4@SiO_2@$(HA/CS)_{10}$-Ti^{4+} in MALDI-TOF MS analysis

No.	Peptide sequence	Number of phosphoryl groups	Observed m/z
β_1	FQ[pS]EEQQQTEDELQDK	1	2061.70
β_2	FQ[pS]EEQQQTEDELQDKIHPF	1	2555.94
β_3	RELEELNVPGEIVE[pS]L[pS][pS][pS]EESITR	4	3122.09

[pS]: phosphorylated site.

Table S3. List of phosphopeptides from diluted human serum after enriched by Fe_3O_4@SiO_2@$(HA/CS)_{10}$-Ti^{4+} in MALDI-TOF MS analysis.

No.	Peptide sequence	Number of phosphoryl groups	Observed m/z
HS_1	D[pS]GEGDFLAEGGGV	1	1389.32
HS_2	AD[pS]GEGDFLAEGGGV	1	1460.36
HS_3	D[pS]GEGDFLAEGGGVR	1	1545.43
HS_4	AD[pS]GEGDFLAEGGGVR	1	1616.46

[pS]:phosphorylated site.

Table S4. List of phosphopeptides from tryptic digest of proteins extracted from nonfat milk after enriched by Fe_3O_4@SiO_2@$(HA/CS)_{10}$-Ti^{4+} in MALDI-TOF MS analysis.

No.	Protein	Peptide sequence	Number of phosphoryl groups	Observed m/z
1	αS2-casein	TVDME[pS]TEVFTK	1	1466.47
2	αS1-casein	VPQLEIVPN[pS]AEER	1	1660.63

3	αS1-casein	YLGEYLIVPN[pS]AEER	1	1832.63
4	αS1-casein	DIG[pS]E[pS]TEDQAMEDIK	2	1927.50
5	αS1-casein	YKVPQLEIVPN[pS]AEER	1	1951.76
6	β-casein	FQ[pS]EEQQQTEDELQDK	1	2601.64
7	β-casein	FQ[pS]EEQQQTEDELQDKIHPE	1	2555.83
8	αS1-casein	Q[Mo]EAE[pS]I[pS][pS][pS]EEIVPN[pS]VEQK	5	2737.78
9	αS2-casein	NANEEEYSIG[pS][pS][pS]EEAEVATEEVK	3	2926.68
10	αS2-casein	FPQ[pY]LQ[pY]LYQGPIVLNPWDQVKR	2	3024.97
11	β-casein	RELEELNVPGEIVE[pS]L[pS][pS][pS]EESITR	4	3121.91

[pS]:phosphorylated site.