Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A

A Novel Route to the Engineering of Zirconium Immobilized Nano-scale Carbon for Arsenate Removal from Water

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Supporting information

SI 1: EDX analysis of ZNC.

SI 2: TEM analysis of ZNC.

SI 3: Cell viability test with breast cancer stem cell (MCF7) on the designed nanoparticles up to 5 days of analysis. The control experiment was normalised as the same cell line was used with different time scales.

SI 4: EDX analysis of arsenate adsorbed on to the ZNC.

SI 5: Comparison of arsenic adsorption efficiency of the functionalized carbon particles with the as prepared carbon particles (sorbent dosage = 0.25 g/L, pH = 7 and pH = 2.5, initial concentration = 50 mg/L, T = 22 ± 1 °C).

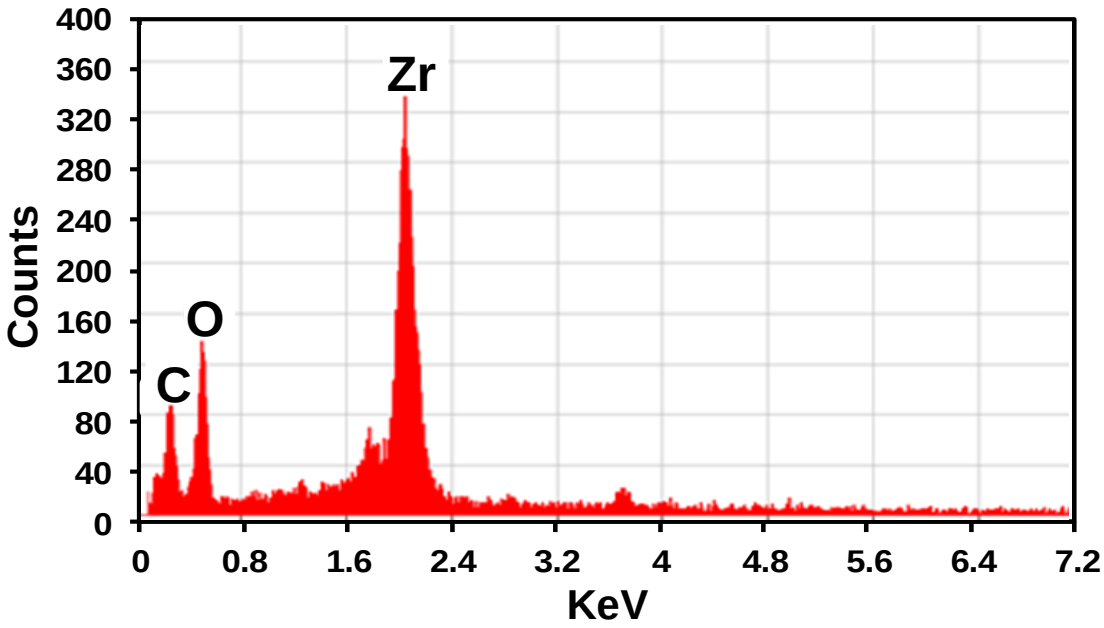
SI 6: Graphs on Final pH after adsorption *vs.* adsorption efficiency (q_e).

SI 7: Effect of humic acid on adsorption of arsenate on to the functionalized adsorbent (sorbent dosage = 1 g/L, pH = 7, initial concentration = 100 mg/L, T = 22 ± 1 °C).

SI 8: Effect of coexisting anions: (a) fluoride; (b) silicate; (c) phosphate; (d) nitrate on the adsorption of the arsenate onto the sorbent (sorbent dosage = 1 g/L, pH = 7, initial concentration = 100 mg/L, T = 22 ± 1 °C).

SI 9: The atomic percentage data of different elements achieved from wide scan XPS spectra.

SI 1: EDX analysis of ZNC.

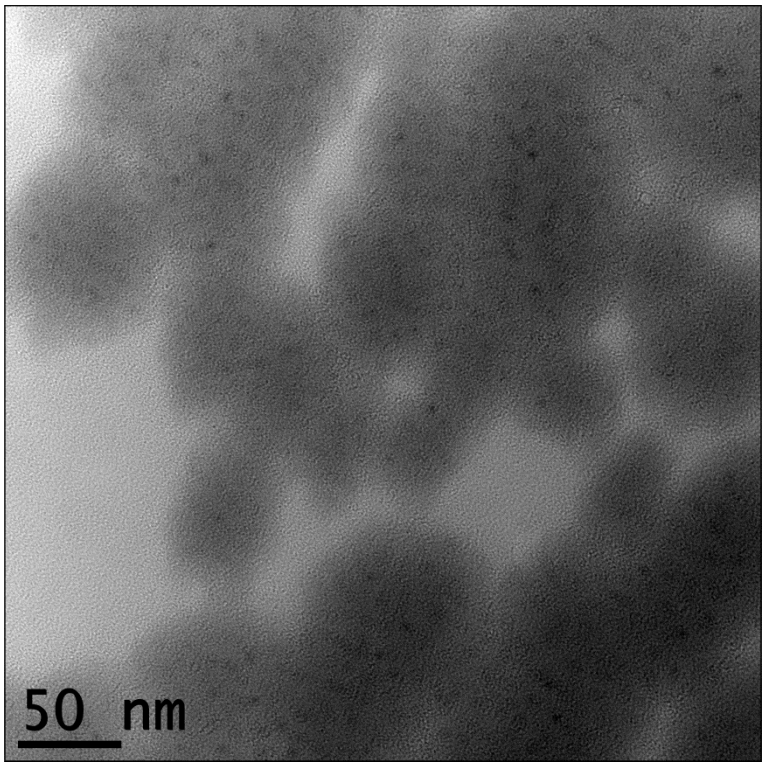


ZAF Method Standardless Quanititative Analysis

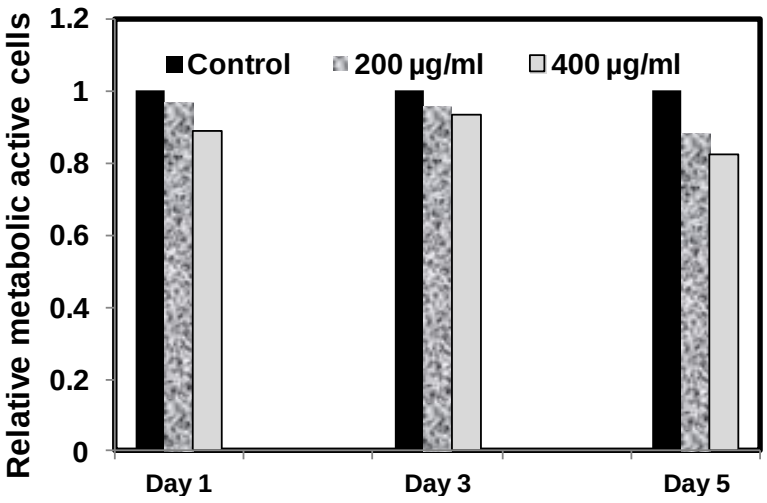
Fitting Coefficient : 0.4231

Element	(keV)	mass %	Error%	Atomic %
C K*	0.277	26.31	0.09	49.26
O K	0.525	28.67	0.18	40.30
Zr L*	2.042	39.98	0.28	9.86
Pt M*	2.048	5.04	0.36	0.58
Total		100.00		100.00

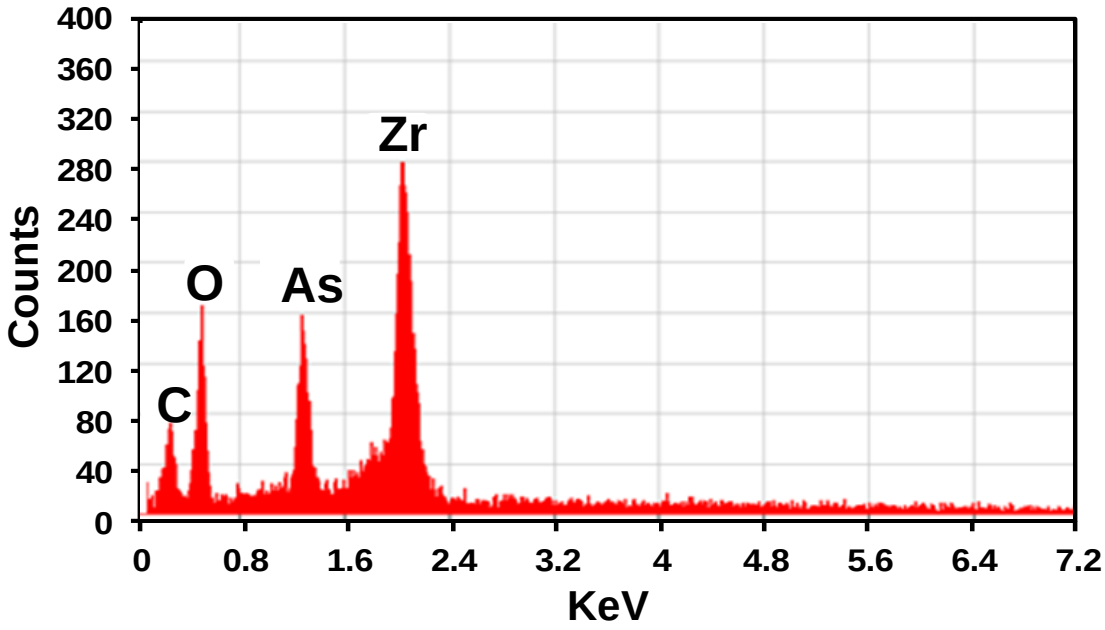
SI 2: TEM analysis of ZNC.



SI 3: Cell viability test with breast cancer stem cell (MCF7) on the designed nanoparticles up to 5 days of analysis. The control experiment was normalised as the same cell line was used with different time scales.



SI 4: EDX analysis of arsenate adsorbed on to the ZNC.

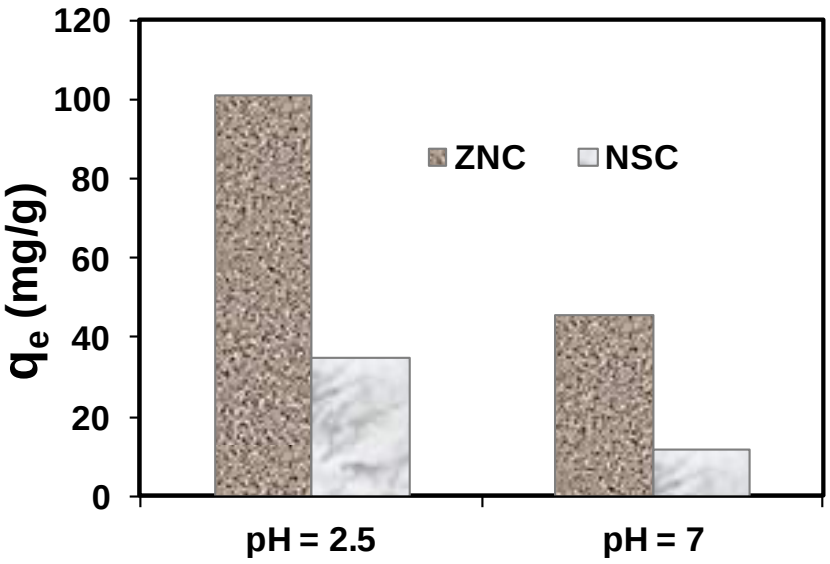


ZAF Method Standardless Quantitative Analysis

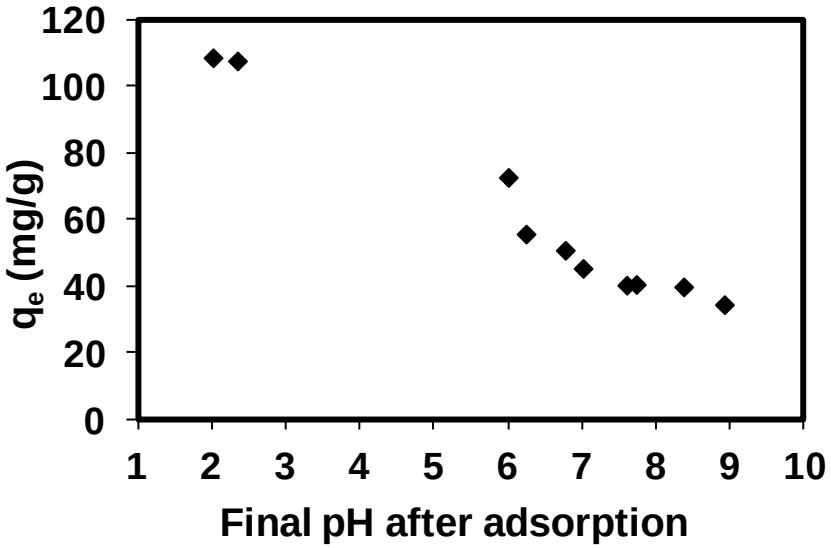
Fitting Coefficient : 0.3877

Element	(keV)	mass %	Error%	Atomic %
C K*	0.277	17.49	0.09	39.48
O K	0.525	26.08	0.15	44.19
As L*	0.282	13.47	0.15	4.88
Zr L*	2.042	34.68	0.28	10.31
Pt M*	2.048	8.28	0.36	1.15
Total		100.00		100.00

SI 5: Comparison of arsenic adsorption efficiency of the functionalized carbon particles with the as prepared carbon particles (sorbent dosage = 0.25 g/L, pH = 7 and pH = 2.5, initial concentration = 50 mg/L, T = 22 ± 1 °C).



SI 6: Graphs on Final pH after adsorption *vs.* adsorption efficiency (q_e).



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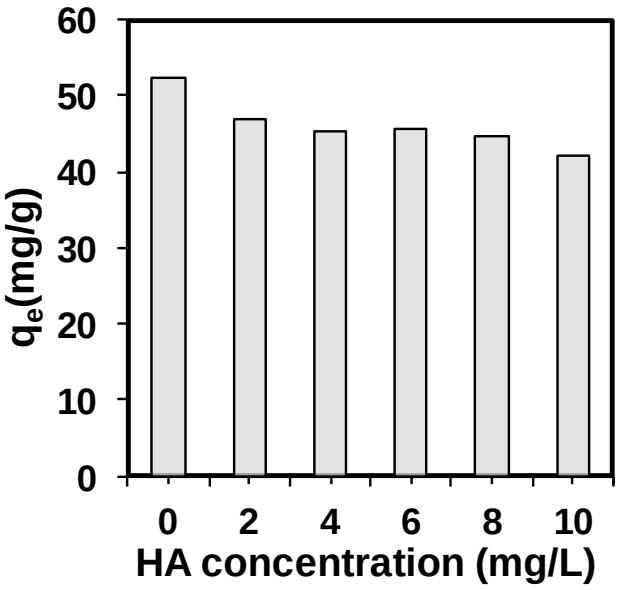
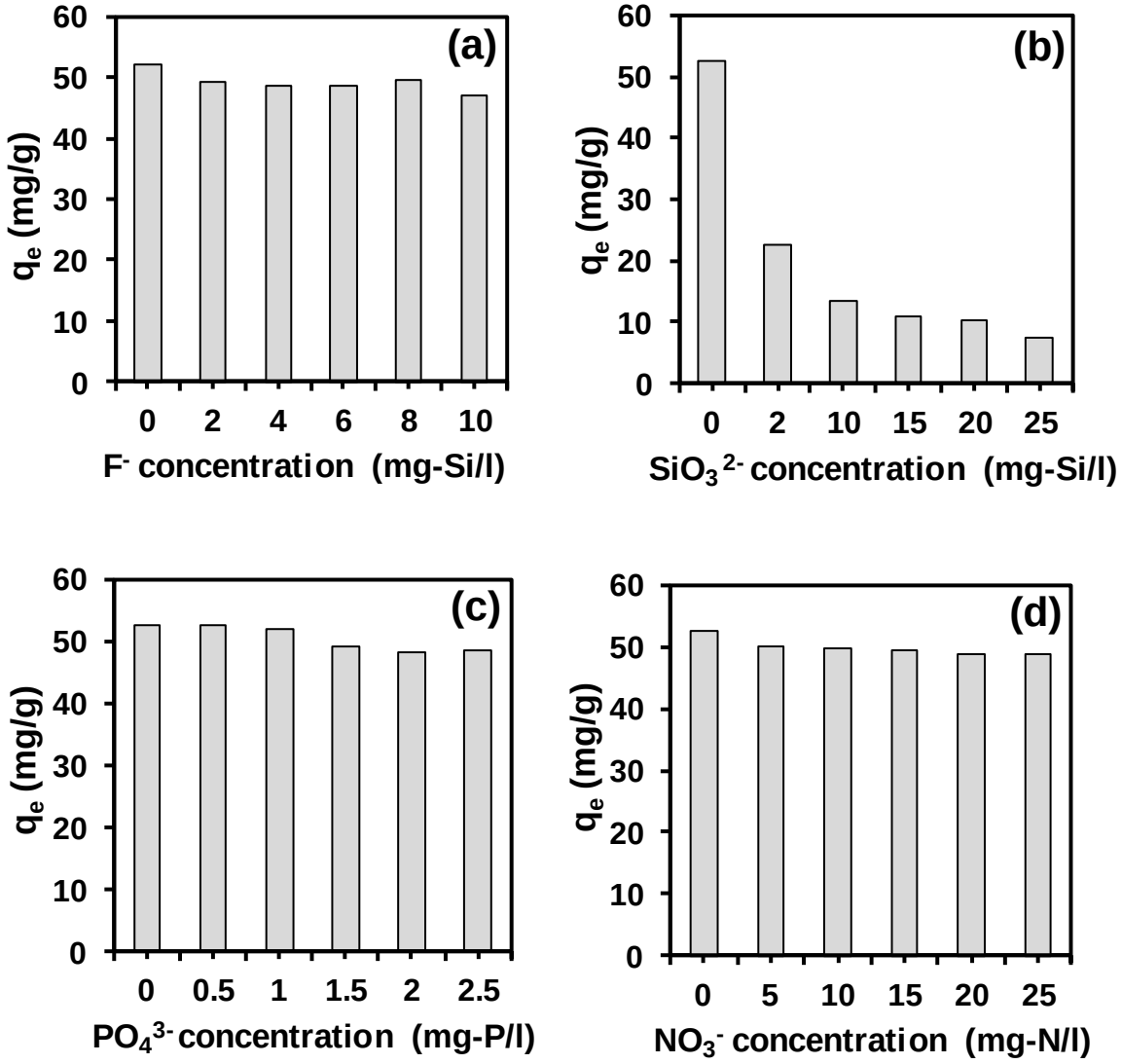


SI 8: Effect of coexisting anions: (a) fluoride; (b) silicate; (c) phosphate; (d) nitrate on the adsorption of the arsenate onto the sorbent (sorbent dosage = 1 g/L, pH = 7, initial concentration = 100 mg/L, T = 22 ± 1 °C).



SI 9: The atomic percentage data of different elements achieved from wide scan XPS spectra.

Atomic %	
O1s	58.5
C1s	22.2
Zr3d	13.5
As3d	5.8