Supplementary information of research paper of "Fabrication and testing of zirconium-based nano-particle doped activated carbon fiber for enhanced arsenic removal in water" by Dandan Zhao, Yang Yu, and J. Paul Chen

1. SEM image of NP doped ACF

The SEM image of the NP doped ACF with an impregnation solution of 0.8-g Zr-based NP is shown in Fig. S1. It can see that, the agglomerates of the CTS and Zr-base NP become large and non-uniform. In addition, the sedimentation of the Zr-based NP in the impregnation solution could be observed with an impregnation solution with 0.8-g Zr-based NP. The results indicate the dosage of the Zr-based NP is more than enough for the coating process. Thus, the dosage of the Zr-based NP for the impregnation solution should not be too high to ensure a uniform coating.
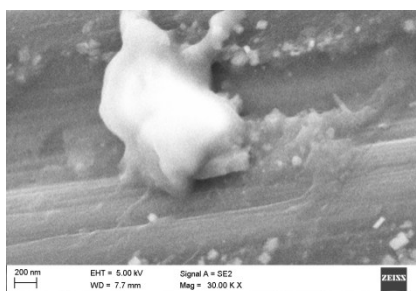

Fig. S1. SEM image of the NP doped ACF with an impregnation solution of 0.8-g Zr-based NP (magnification of 30,000).

2. $L_9 (3)^4$ orthogonal array design approach

The design and results of $L_9 (3)^4$ orthogonal experiment are given in Table S1.

Table S1 Results of the $L_9 (3)^4$ or8thogonal array design approach.

Runs	Factors				q_e (mg/g)
	CTS (%)	PEG (%)	Mw of CTS	Zr (g)	
1	0.1	0.1	L	0.2	2.63
2	0.1	0.2	M	0.4	2.70
3	0.1	0.3	H	0.6	0.39
4	0.2	0.1	M	0.6	1.16
5	0.2	0.2	H	0.2	1.16
6	0.2	0.3	L	0.4	0.52
7	0.3	0.1	H	0.4	4.23
8	0.3	0.2	L	0.6	9.25
9	0.3	0.3	M	0.2	3.15

3. Two tail t-test statistical analyses

Table S2 Two tail t-test statistical analyses.

Source	Sum of Squares	df	Mean Square	F Value	Sig.
CTS	2.931	2	1.466	0.154	0.861
PEG	13.721	2	6.861	0.886	0.46
Mw of CTS	8.265	2	4.133	0.478	0.642
Zr	35.276	2	17.638	4.247	0.041