SUPPLEMENTARY INFORMATION

Arsenic sorption onto aluminum oxyhydroxide-poly[(4-vinylbenzyl) trimethylammonium chloride] hybrid sorbent

Jehú Pérez[a], Leandro Toledo[a], Cristian H. Campos[b], Jorge Yañez[c], Bernabé L. Rivas[a] and Bruno F. Urbano[a*]

[a] Department of Polymer, Faculty of Chemical Sciences, University of Concepción, Chile.

[b] Department of Organic Chemistry, Faculty of Chemical Sciences, University of Concepción, Chile.

[c] Department of Analytical and Inorganic Chemistry, Faculty of Chemical Sciences, University of Concepción, Chile

* Corresponding author: Dr. Bruno F. Urbano / e-mail: burbano@udec.cl / phone: +56 041 2203538

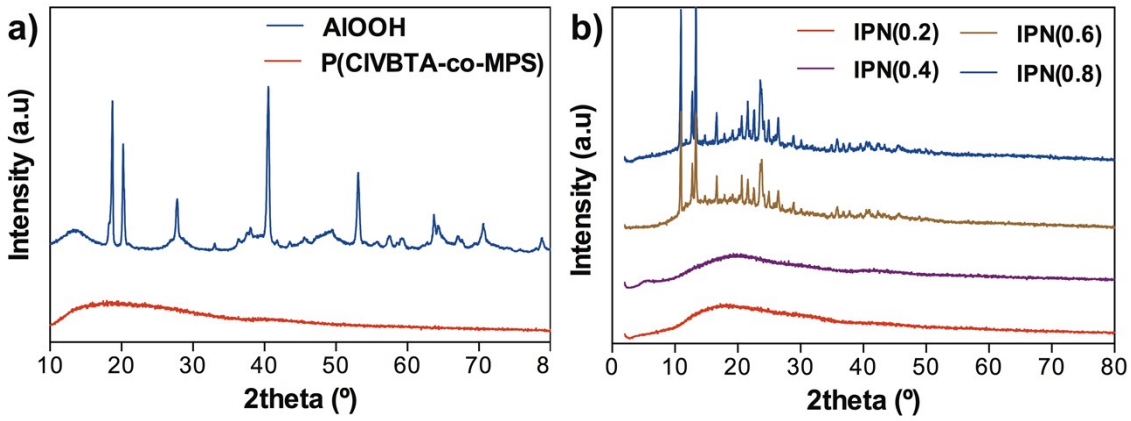
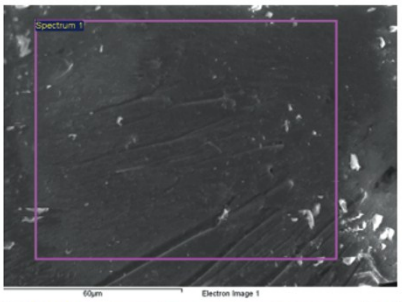
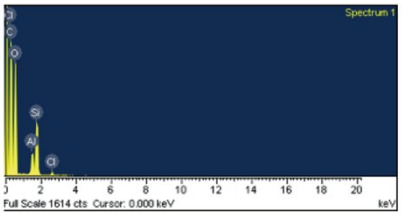


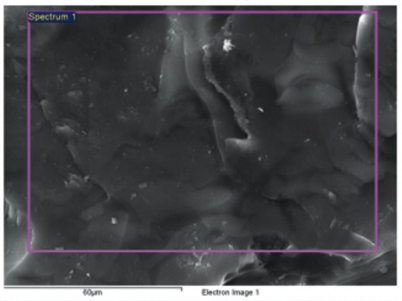
Figure S1. X-ray diffraction pattern of a) control sorbents and b) hybrids.



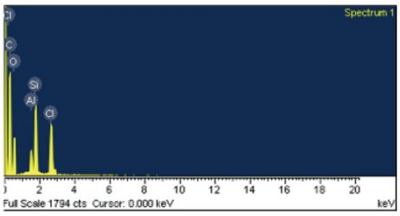
IPN(0.8)



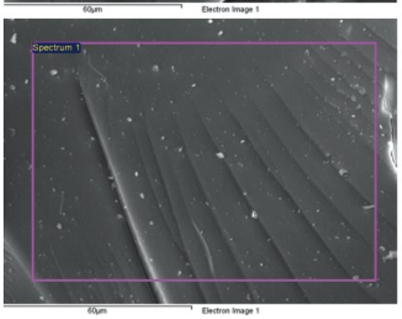
Element	Weight (%)	Atomic (%)
C	48.71	57.63
O	42.95	38.15
Al	2.14	1.13
Si	5.78	2.92
Cl	0.42	0.17
Total	100.00	



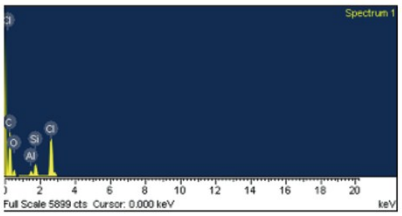
IPN(0.6)



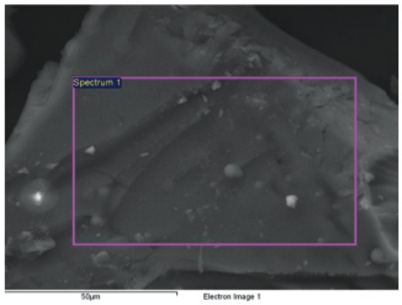
Element	Weight (%)	Atomic (%)
C	63.28	73.32
O	24.13	20.99
Al	1.67	0.86
Si	5.28	2.62
Cl	5.64	2.22
Total	100.00	



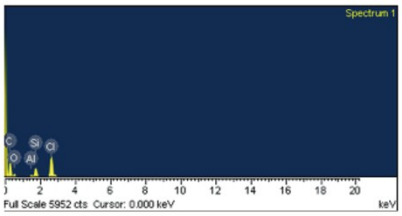
IPN(0.4)



Element	Weight (%)	Atomic (%)
C	74.04	83.71
O	12.94	10.98
Al	0.82	0.41
Si	2.18	1.05
Cl	10.03	3.84
Total	100.00	



IPN(0.2)



Element	Weight (%)	Atomic (%)
C	71.99	82.63
O	12.83	11.05
Al	0.51	0.26
Si	3.44	1.69
Cl	11.23	4.37
Total	100.00	

Figure S2. Scanning electron micrograph and energy dispersive X-ray analysis of the IPN hybrid surfaces.

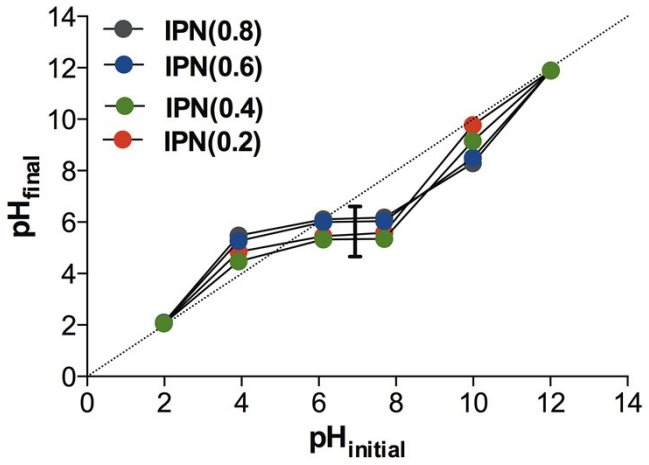


Figure S3. Evaluation of the pH change [KCl 1 mM, room temperature].

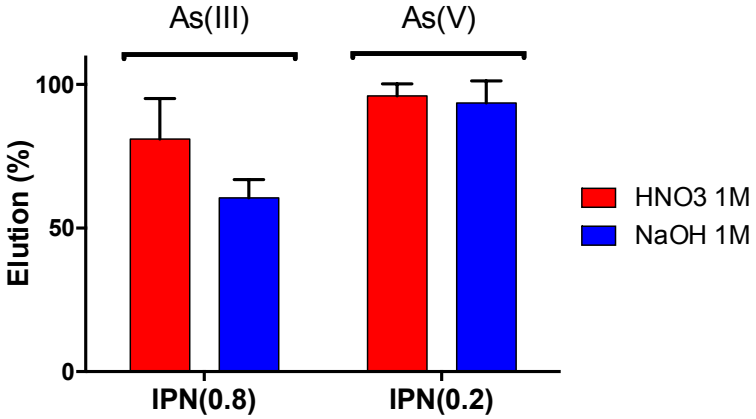


Figure S4. Regeneration studied of As(V) and As(III) for selected hybrids.

Table S1. Comparison if sorption capacities of diverse hybrid sorbents.

Hybrid sorbent		q ($mg \cdot g^{-1}$)		
Organic	Inorganic	As(III)	As(V)	Ref.
D201	HZO	--	88.7	[1]
Polyacrylamide	Zr(IV)	41.4	--	[2]
Chelating resin	Fe(III)	62.9	55.4	[3]
Chelating resin	Zr(IV)	49.1	88.7	[4]
Chelating resin	Zr(IV)	--	149.9	[5]
FIBAN®	HFO	75.6	81.6	[6]
Amberlite XAD-7	Ti(IV)	9.7	4.7	[7]
Quaternary ammonium polymer	HZO	127.6	95.6	[8]
Quaternary ammonium polymer	AlOOH	81.8	80.6	Present study

HZO: Hydrous zirconium oxide; HFO: Hydrated ferric oxide

[1] B. Pan, Z. Li, Y. Zhang, J. Xu, L. Chen, H. Dong, W. Zhang, Acid and organic resistant nano-hydrated zirconium oxide (HZO)/polystyrene hybrid adsorbent for arsenic removal from water, Chem. Eng. J., 248 (2014) 290-296.
[2] S. Mandal, M.K. Sahu, R.K. Patel, Adsorption studies of arsenic(III) removal from water by zirconium polyacrylamide hybrid material (ZrPACM-43), Water Resources and Industry, 4 (2013) 51-67.
[3] H. Matsunaga, T. Yokoyama, R.J. Eldridge, B.A. Bolto, Adsorption characteristics of arsenic(III) and arsenic(V) on iron(III)-loaded chelating resin having lysine-Nα,Nα-diacetic acid moiety, Reactive and Functional Polymers, 29 (1996) 167-174.
[4] T. Balaji, T. Yokoyama, H. Matsunaga, Adsorption and removal of As(V) and As(III) using Zr-loaded lysine diacetic acid chelating resin, Chemosphere, 59 (2005) 1169-1174.
[5] N. Seko, F. Basuki, M. Tamada, F. Yoshii, Rapid removal of arsenic(V) by zirconium(IV) loaded phosphoric chelate adsorbent synthesized by radiation induced graft polymerization, Reactive and Functional Polymers, 59 (2004) 235-241.
[6] O.M. Vatutsina, V.S. Soldatov, V.I. Sokolova, J. Johann, M. Bissen, A. Weissenbacher, A new hybrid (polymer/inorganic) fibrous sorbent for arsenic removal from drinking water, Reactive and Functional Polymers, 67 (2007) 184-201.
[7] T. Balaji, H. Matsunaga, Adsorption characteristics of As(III) and As(V) with titanium dioxide loaded Amberlite XAD-7 resin, Anal. Sci., 18 (2002) 1345-1349.
[8] J. Pérez, L. Toledo, C.H. Campos, B.L. Rivas, J. Yañez, B.F. Urbano, Organic–inorganic interpenetrated hybrids based on cationic polymer and hydrous zirconium oxide for arsenate and arsenite removal, Chem. Eng. J., 287 (2016) 744-754.