**SUPPORTING INFORMATION**

Quick-fix Agarose Beads Impregnated with Hydrous Ferric Oxide for As(III) Species Removal from Pharmaceutical Wastewater

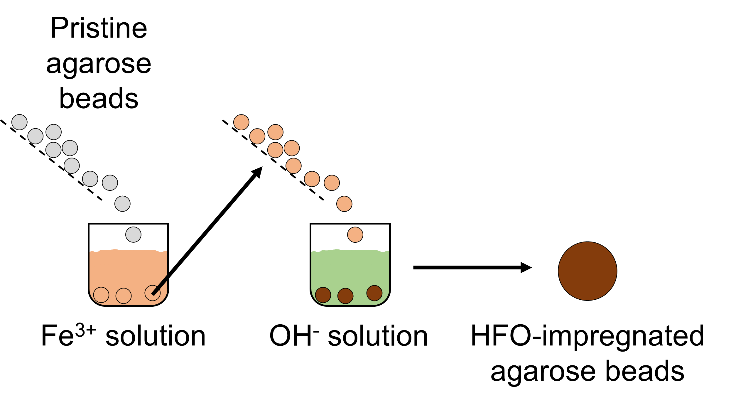
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a Department of Chemical and Materials Engineering, National Central University,

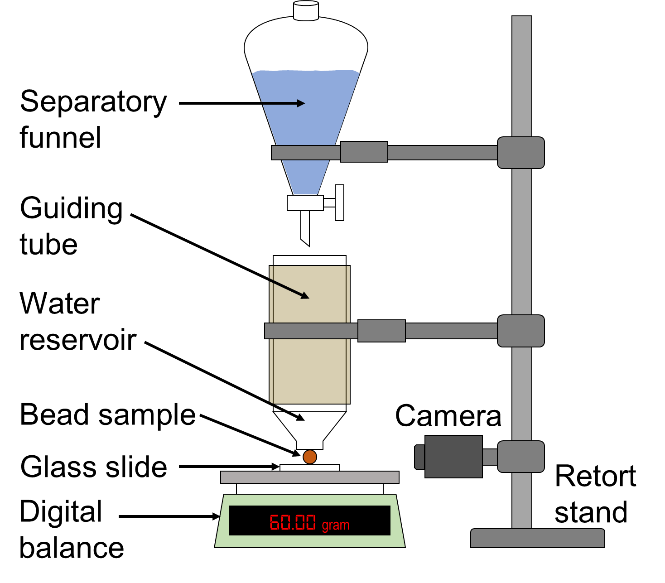
300 Zhongda Road, Zhongli District, Taoyuan City 32001, Taiwan, R.O.C.

b TTY Biopharm Co. Ltd., Pharmaceutical Development Center,

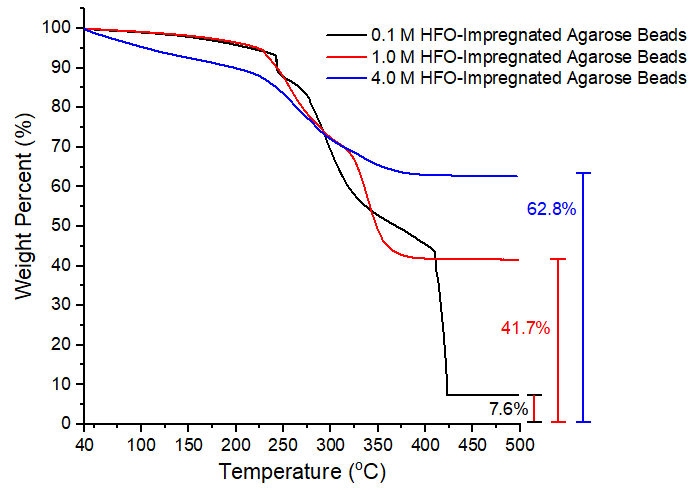
3F., No. 124, Xingshan Road, Neihu District, Taipei City 11469, Taiwan, R.O.C.



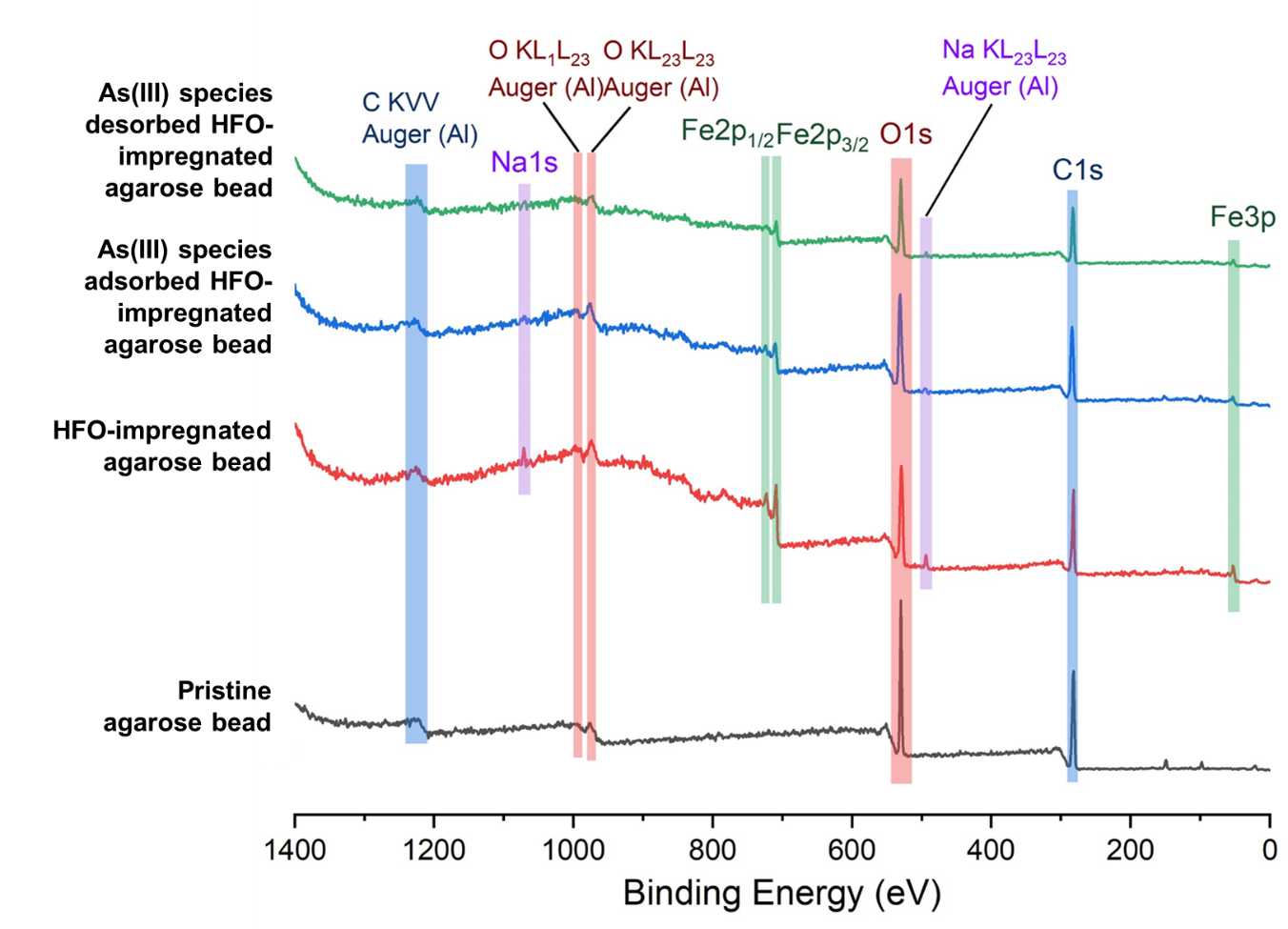
**Figure S1.** Schematic diagram of in-situ precipitation technique.



**Figure S2.** Compression test apparatus setup.



**Figure S3.** TGA scans of 0.1, 1.0, and 4.0 M HFO-impregnated agarose beads. Scans were performed under air flow.



**Figure S4.** XPS survey spectra of pristine agarose bead and 1.0 M HFO-impregnated agarose beads before and after As(III) adsorption and desorption.

**Table S1.** Experimental results of As(III) species adsorption and desorption.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Desorption Experiments** | **Initial As(III) Species Concentration, C0 (mg/L)** | **Amount of As(III) Species Adsorbed (mg adsorbate / g adsorbent)** | **Amount of As(III) Species Retained**  **After Desorption (mg adsorbate / g adsorbent)** | **Percent Desorbed (%)** | **Average Percent Desorbed (%)** |
| 0.05 M NaOH | 20 | 18.5 | 9.3 | 50 | 66 |
| 40 | 35.8 | 11.7 | 67 |
| 60 | 50.3 | 16.7 | 67 |
| 80 | 59.4 | 16.6 | 72 |
| 100 | 66.1 | 16.4 | 75 |
| 0.1 M NaOH | 20 | 18.7 | 8.7 | 53 | 69 |
| 40 | 35.6 | 10.9 | 69 |
| 60 | 50.0 | 15.7 | 69 |
| 80 | 60.3 | 14.8 | 75 |
| 100 | 64.2 | 14.4 | 78 |
| 0.5 M NaOH | 20 | 18.3 | 7.5 | 59 | 70 |
| 40 | 36.7 | 11.0 | 70 |
| 60 | 50.0 | 14.7 | 71 |
| 80 | 57.2 | 14.1 | 75 |
| 100 | 66.6 | 16.8 | 75 |
| 1.0 M NaOH | 20 | 18.9 | 9.1 | 52 | 70 |
| 40 | 36.3 | 12.9 | 64 |
| 60 | 46.4 | 10.9 | 76 |
| 80 | 55.1 | 14.5 | 74 |
| 100 | 65.2 | 10.8 | 83 |
| 3.0 M NaOH | 20 | 18.3 | 6.6 | 64 | 69 |
| 40 | 36.1 | 12.9 | 64 |
| 60 | 49.9 | 14.4 | 71 |
| 80 | 55.2 | 15.2 | 72 |
| 100 | 67.0 | 18.1 | 73 |

**Equation S1**

|  |  |  |
| --- | --- | --- |
|  |  | (S1) |

**Equation S2 and S3**

|  |  |  |
| --- | --- | --- |
|  |  | (S2) |
|  |  | (S3) |
|  | where:  E = Young’s modulus (Pa)  v = Poisson’s ratio (~0.5 for agarose gel)33  F = force of indenting ball against gel surface (N)  h = depth of penetration of the indenting ball (m)  r = radius of the ball (m)  Cx = crosslink density (mol of crosslink / m3)  R = gas constant (8.314 m3.Pa.K-1.mol-1)  T = temperature (K) |  |

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