

## Electronic Supplementary Information

### Bacterial bioreporter detection of arsenic associated with iron oxides

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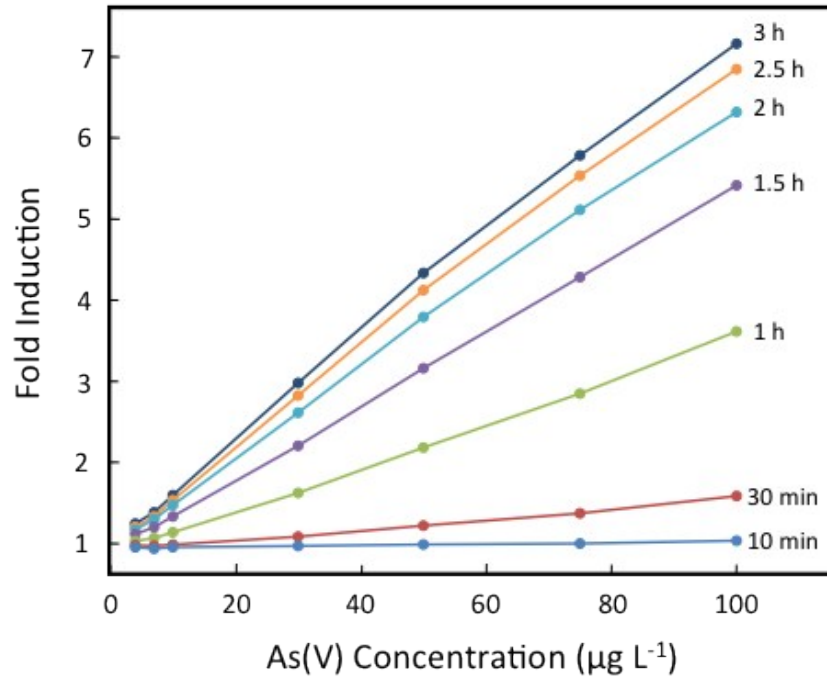


Figure S1: Kinetics of light development for a standard As(V) calibration curve.

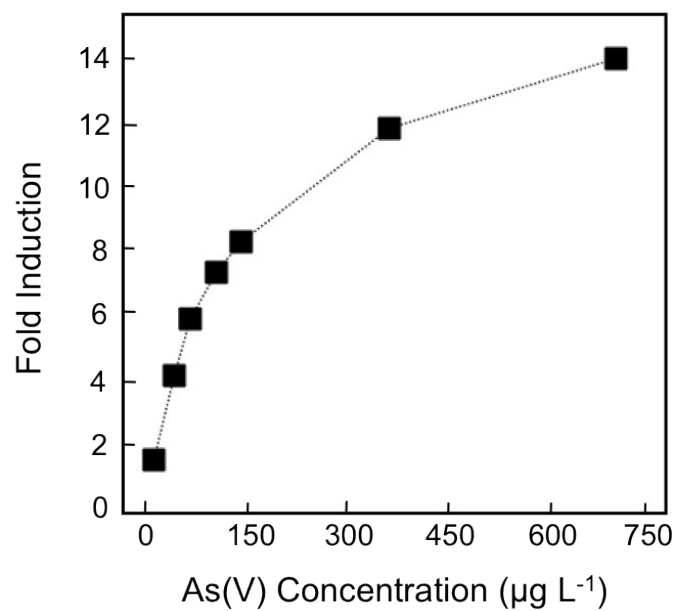


Figure S2: Representative As(V) calibration curve performed out to an As concentration of  $750 \mu\text{g L}^{-1}$ .

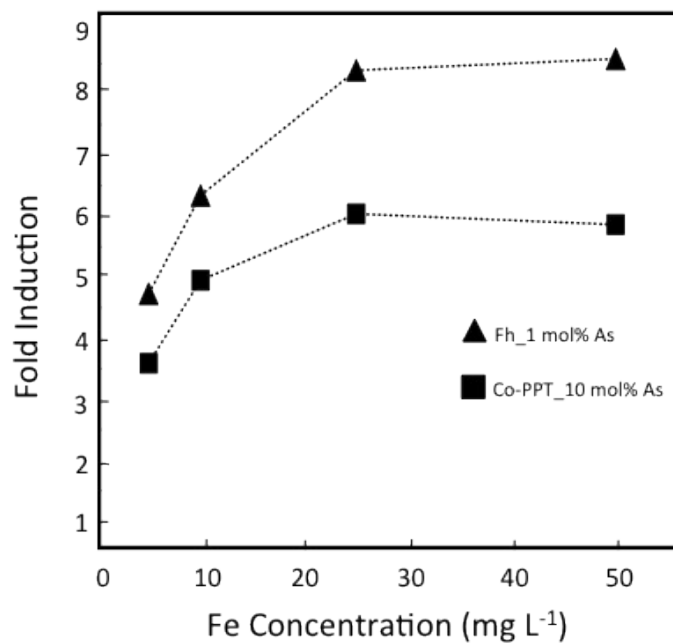


Figure S3: Response of the bioreporters (fold induction) as a function of Fe dosed. The response of the bioreporters decreases or becomes negative with particulate Fe concentrations above 10 mg Fe L<sup>-1</sup> (19.1 mg Fe(OH)<sub>3</sub> L<sup>-1</sup>).

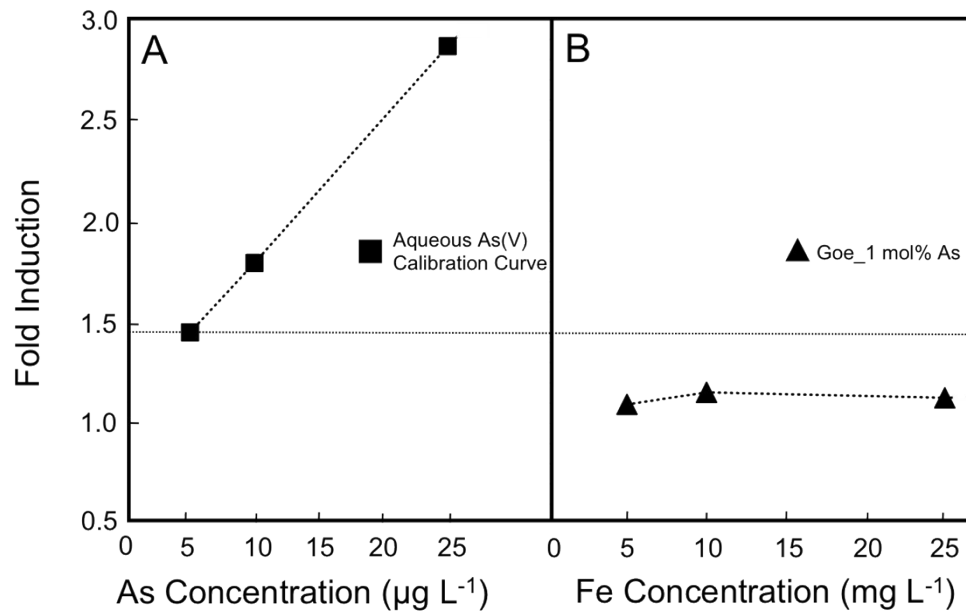


Figure S4: A) The low range ( $5 - 25 \mu\text{g L}^{-1}$ ) of a representative As(V) calibration curve. B) The response of bioreporters to As(V)-adsorbed goethite as a function of total Fe dosed in  $\text{mg L}^{-1}$ . For all Fe concentrations, the bioreporter signal was lower than the smallest As(V) concentration of the calibration curve, which is indicated by the dashed horizontal line.

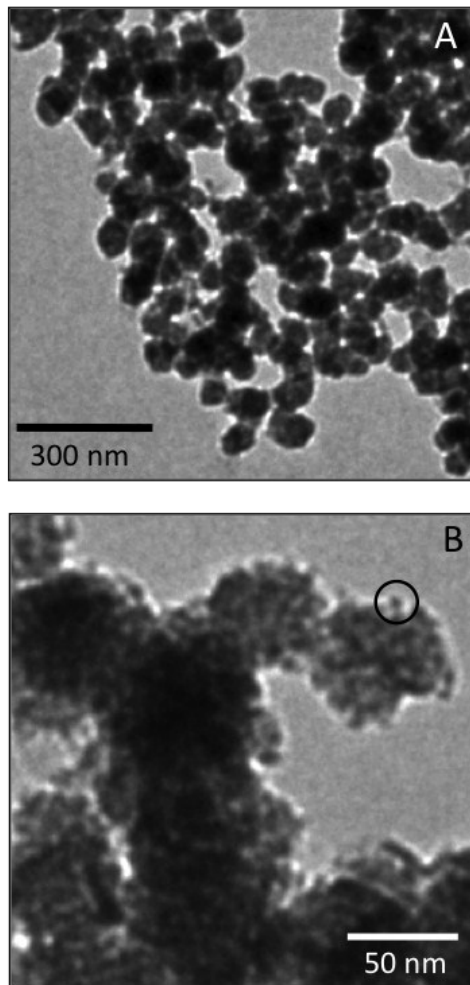


Figure S5: Transmission electron micrographs of the Co-PPT\_23mol% As+Ca sample showing dense aggregates ( $\approx 70 - 100$  nm, Panel A) of nanoscale primary crystallites (Panel B  $\approx 2 - 5$  nm).

**Table S1: Summary of individual measurements for a select bioassay for each ADS and Co-PPT sample**

Sample Name	Fe in Suspension (mg L <sup>-1</sup> )	As in Suspension (µg L <sup>-1</sup> )		As in Solution (µg L <sup>-1</sup> )		Bio-Detected As(V) Fraction
	ICP	ICP	Bio	ICP	Bio	
ADS Goe_1 mol% As <sup>1</sup>	0.5	3.1	< 1	< 1	< 1	0
	1.3	7.7	< 1	< 1	< 1	0
	2.6	15.5	< 1	< 1	< 1	0
ADS Fh_1 mol% As <sup>2</sup>	0.7	11.5	9.0	< 1	4.8	0.36
	1.4	23.1	13.6	< 1	4.8	0.38
	3.6	57.7	26.7	< 1	4.8	0.38
ADS Fh_1 mol% As+Ca <sup>2</sup>	0.7	10.3	4.0	< 1	1.5	0.25
	1.3	20.5	5.6	< 1	1.0	0.23
ADS Fh_6 mol% As <sup>2</sup>	0.5	33.4	14.7	2.3	2.1	0.38
	1.0	66.8	39.2	4.7	4.7	0.52
	2.4	167.1	107.6	11.8	12.8	0.57
ADS Fh_6 mol% As+Ca <sup>2</sup>	0.7	53.6	19.4	< 1	3.7	0.29
	1.4	107.2	33.7	< 1	2.7	0.29
Co-PPT_10 mol% As <sup>3</sup>	0.5	62.1	7.2	< 1	< 1	0.11
	0.9	124.1	13.4	1.8	< 1	0.11
	2.3	310.2	40.6	4.5	4.5	0.12
Co-PPT_23 mol% As+Ca <sup>3</sup>	0.7	93.5	11.2	< 1	< 1	0.12
	1.5	186.9	24.2	< 1	< 1	0.13
	3.7	467.3	57.2	< 1	< 1	0.12
Co-PPT_22 mol% As <sup>3</sup>	0.6	170.8	10.7	4.9	6.6	0.02
	1.2	341.6	28.4	9.8	9.8	0.05
Co-PPT_28 mol% As+Ca <sup>3</sup>	0.7	267.3	47.2	12.8	12.3	0.13
	1.5	534.6	78.8	25.5	21.4	0.11
Co-PPT_59 mol% As+Ca <sup>3</sup>	0.8	624.5	100.0	4.2	6.9	0.15
Co-PPT_SBGW <sup>4</sup>	0.7	12.8	5.0	< 1	2.3	0.21
	1.4	25.6	6.2	< 1	2.3	0.15
	3.5	63.9	9.3	< 1	2.4	0.11

Columns identified by “ICP” and “Bio” indicate concentrations of Fe or As that were detected by inductively-coupled plasma optical emission spectrometry or by bacterial bioreporters, respectively.