Element	Product	Formula	MM ($g.mol^{-1}$)	Cas number
Aluminum (Al)	Aluminum(III) potassium sulfate dodecahydrate	$AlK(SO_4)_2 \cdot 12H_2O$	474.37	7784-24-9
Antimony (Sb)	Antimony(III) chloride	$SbCl_3$	228.13	10025-91-9
Arsenic (As)	Sodium (meta)arsenite	$AsNaO_2$	129.91	7784-46-5
Barium (Ba)	Barium(II) acetate	$Ba(CH_3COO)_2$	255.43	543-80-6
Cadmium (Cd)	Cadmium(II) chloride	$CdCl_2$	183.32	10108-64-2
Cobalt (Co)	Cobalt(II) chloride hexahydrate	$CoCl_2 \cdot 6H_2O$	237.9	7791-13-1
Copper (Cu)	Copper(II) chloride dihydrate	$CuCl_2 \cdot 2H_2O$	170.48	10125-13-0
Mercury (Hg)	Mercury(II) chloride	$HgCl_2$	271.52	7487-94-7
Molybdenum (Mo)	Sodium molybdate(VI) dihydrate	$Na_2MoO_4 \cdot 2H_2O$	241.95	10102-40-6
Nickel (Ni)	Nickel(II) chloride, hexahydrate	$NiCl_2 \cdot 6H_2O$	237.71	7791-20-0
Silver (Ag)	Silver(I) nitrate	$AgNO_3$	169.87	7761-88-8
Zinc (Zn)	Zinc(II) chloride	$ZnCl_2$	136.28	7646-85-7

Table S1. List of metal ion species used in this study

		As(III)	Cd(II)	Co(II)	Cu(II)	Hg(II)	Mo(VI)	Ni(II)	Sb(III)	Zn(II)
IC_{50} AMB-1	(μM)	259 ± 25	27.5 ± 0.6	33.1 ± 4.2	23.1 ± 3.3	0.4 ± 0.1	$5.49 \times 10^3 \pm 1.81 \times 10^3$	33.6 ± 1.7	40.7 ± 10.3	29.7 ± 2.4
	(mg/L)	19.4 ± 1.9	3.1 ± 0.1	2.0 ± 0.2	1.5 ± 0.2	0.08 ± 0.03	$5.27 \times 10^2 \pm 1.74 \times 10^2$	2.0 ± 0.1	5.0 ± 1.3	1.9 ± 0.2
IC_{50} MSR-1	(μM)	406 ± 23	25.3 ± 2.9	696 ± 150	130 ± 16	5.8 ± 1.5	$3.10 \times 10^4 \pm 2.50 \times 10^4$	248 ± 32	42.0 ± 3.9	38.3 ± 4.3
	(mg/L)	30.4 ± 1.7	2.8 ± 0.3	41.0 ± 8.8	8.3 ± 1.0	1.2 ± 0.3	$2.98 \times 10^3 \pm 0.24 \times 10^3$	14.5 ± 1.9	5.1 ± 0.5	2.5 ± 0.3
Max concentration in drinking water (mg/L)		0.01[a,b]	0.005[a,b]	0.001[c]	2[a]	0.001[a,b]	0.07[b]	0.02[a]	0.005[a]	3[b]
Max concentration in industrial effluent (mg/L)		0.83	0.25		1	0.07		4	0.5	7,8

Table S2. Resistance of AMB-1 and MSR-1 to a set of metal ions evaluated by calculation of half maximal inhibitory concentrations (IC_{50}) and comparison with legislations for drinking water and industrial effluents.

Guidelines for drinking water values were obtained from [a]Council Directive 98/83/EC of 3 November 1998 for the European Union / [b]WHO guidelines for drinking water / [c]Australia and USA guidelines. Guidelines for industrial effluents are from the French legislation on water release for exploitations whose activity is susceptible of having a negative impact on the environment and human health. For cobalt and molybdenum there are no fixed values because each exploitation have a proper authorized limit.

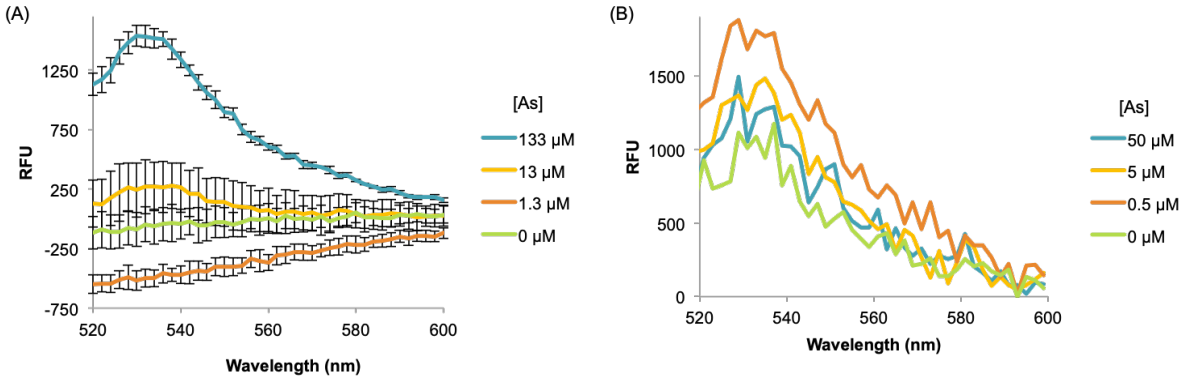

Figure S1. Flurorescence signal from (A) *E. coli* and (B) AMB-1 housing arsenic biosensors built using *Pars* from *E. coli* and *Venus* as reporter.

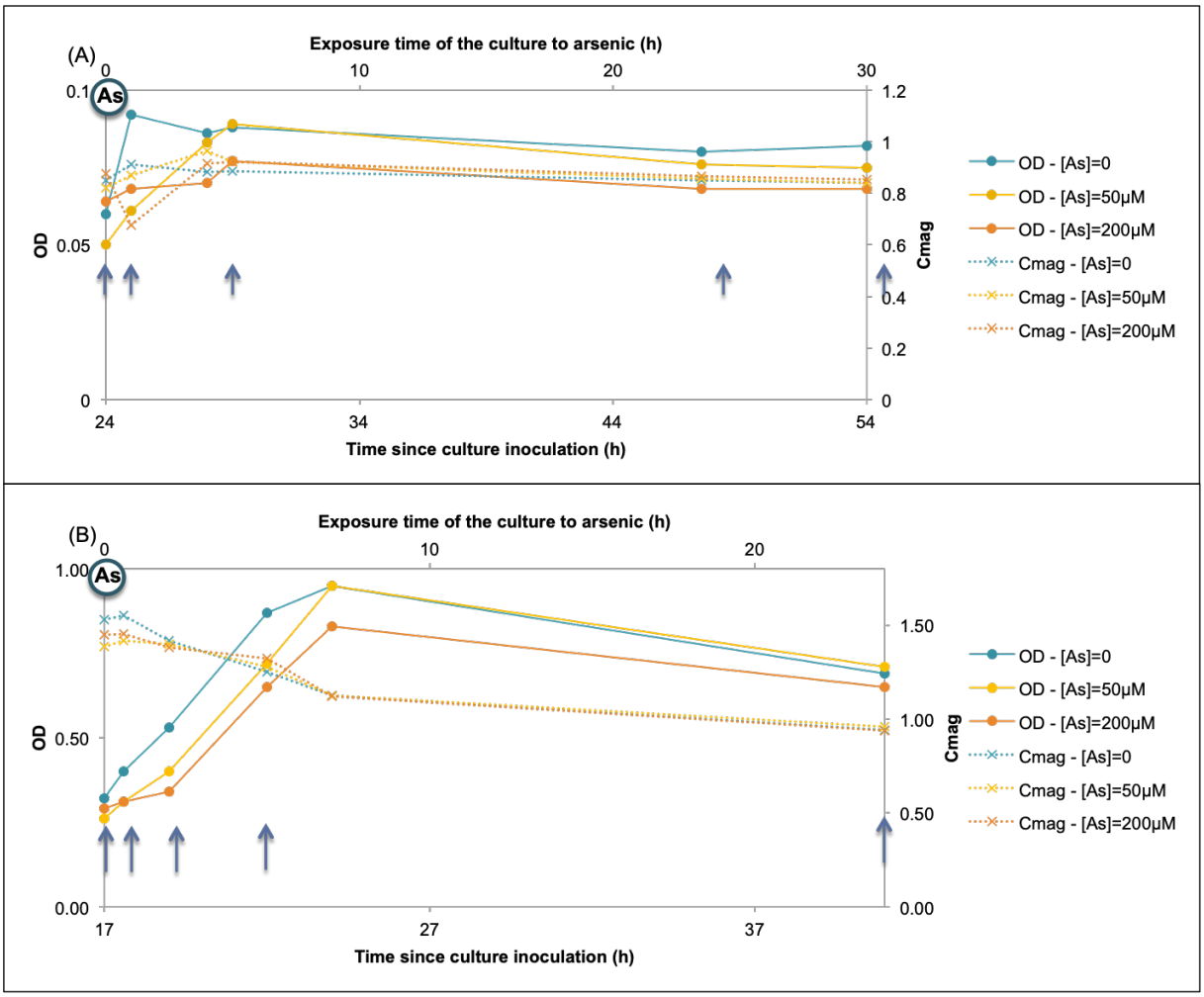

Figure S2. Evolution of the growth and magnetism of the culture of (A) AMB-1 and (B) MSR-1 exposed to arsenic. Blue arrows indicate sampling times. The cultivation time is indicated in abscise and the secondary abscise correspond to the time the culture was exposed to arsenic, addition of the metal is indicated by the circle.

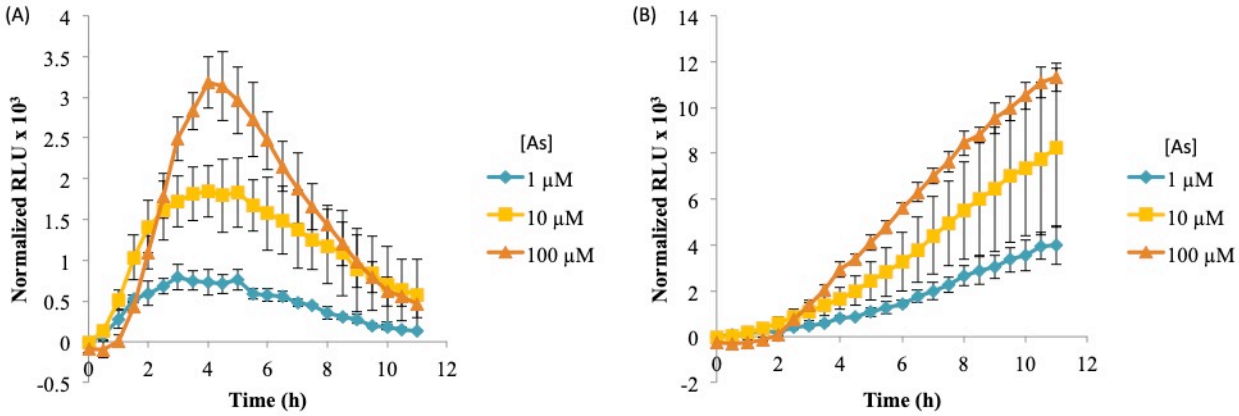

Figure S3. Kinetic of the luminescence response of the MSR-Pred biosensor after freeze-drying with (A) mannose or (B) trehalose.