



## Supporting Information

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Self-Propelled Activated Carbon Janus Micromotors for  
Efficient Water Purification

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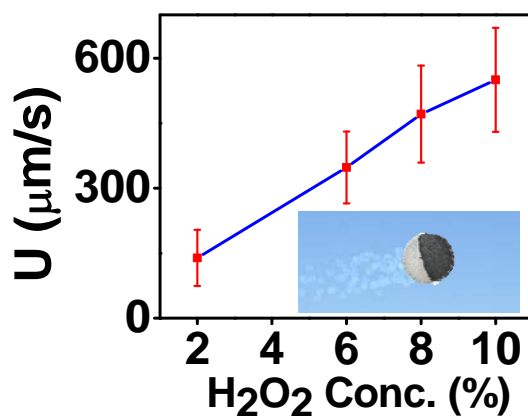
## Supporting Information

**Self-propelled activated-carbon Janus micromotors for efficient water purification**

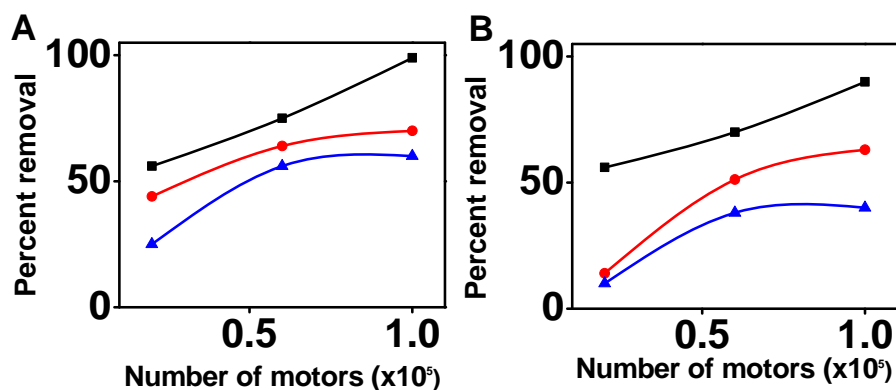
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**SI Video 1.** Propulsion of a spherical activated-carbon/Pt micromotors and of a (PS)/Pt micromotor in ultrapure water in the presence of 10% H<sub>2</sub>O<sub>2</sub> and 2% sodium cholate solutions.

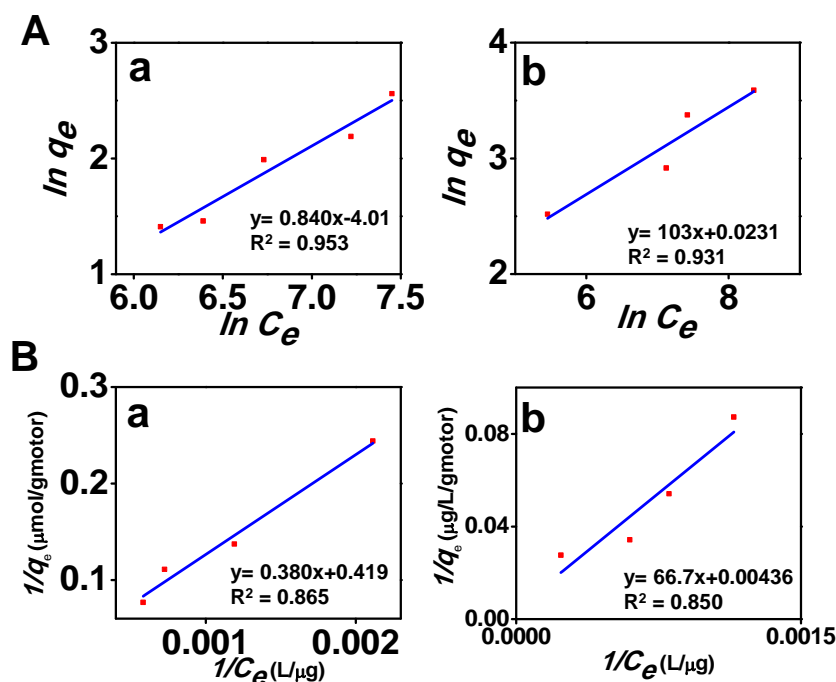
**SI Video 2.** Propulsion of multiple spherical activated-carbon/Pt micromotors and of (PS)/Pt micromotors in seawater in the presence of 10% H<sub>2</sub>O<sub>2</sub> and 2% sodium cholate solutions.



**Figure S1.** Dependence of the activated-carbon/Pt Janus micromotors speed upon the hydrogen peroxide concentration over the 2-10% range, in the presence of 2% sodium cholate ( $n=10$ ).



**Figure S2.** Effect of the number of activated-carbon/Pt micromotors upon the removal of different concentrations of (A) DNT (100, black line, 150, red line and 200 mg/L, blue line) and (B) Pb<sup>2+</sup> (2, black line, 4, red line and 6 mg/L, blue line). Conditions: 2% H<sub>2</sub>O<sub>2</sub>, 2% sodium cholate (for DNT) or sodium dodecyl sulphate (for Pb<sup>2+</sup>) and 2, 6 or 10 x10<sup>5</sup> micromotors in a total volume of 0.5 mL; 5 min reaction time.



**Figure S3.** (A) Freundlich isotherms plots for *methyl-paraoxon* (a) and Pb<sup>2+</sup> adsorption (b) onto activated-carbon/Pt micromotors. (B) Langmuir isotherms plots for *methyl-paraoxon* (a) and Pb<sup>2+</sup> adsorption (b) onto activated-carbon/Pt micromotors. Conditions: 10<sup>6</sup> micromotors in a total volume of 0.5 mL, methyl-paraoxon concentration: 750-3000 μM, Pb<sup>2+</sup> concentration: 2000-6000 μg/L, 2% H<sub>2</sub>O<sub>2</sub> and 2% sodium dodecyl sulphate, 5 min reaction time

**Table S1.** Pseudo first- and second-order adsorption rate constants, and calculated and experimental  $q_e$  values for different initial methyl-paraoxon and  $\text{Pb}^{2+}$  concentrations.

<i>Methyl-paraoxon</i>						
$C_o$ ( $\mu\text{M}$ )	$q_{e,\text{exp}}$ ( $\mu\text{M/g}$ )	First-order kinetic model		Second-order kinetic model		
		$q_{e,\text{cal}}$ ( $\mu\text{M/g}$ )	$R^2$	$k_2$ ( $\text{sec}^{-1}$ )	$q_{e,\text{cal}}$ [( $\text{g } (\mu\text{M}/\text{sec}^{-1})$ )]	$R^2$
750	3.42	0.820	0.978	0.021	3.35	0.982
1000	4.09	1.43	0.757	0.029	4.05	0.996
1500	7.89	2.84	0.919	0.015	8.05	0.991
2000	9.00	7.54	0.965	0.013	8.79	0.991
3000	18.3	3.19	0.824	0.012	17.7	0.998
<b>Pb</b>						
$C_o$ ( $\mu\text{g/L}$ )	$q_{e,\text{exp}}$ ( $\mu\text{g L/g}$ )	First-order kinetic model		Second-order kinetic model		
		$q_{e,\text{cal}}$ ( $\mu\text{g L/g}$ )	$R^2$	$k_2$ ( $\text{sec}^{-1}$ )	$q_{e,\text{cal}}$ [( $\text{g } (\mu\text{M}/\text{sec}^{-1})$ )]	$R^2$
2000	12.30	1.00	0.934	0.010	8.70	0.997
5000	29.20	1.01	0.801	0.0003	26.1	0.999