

Supplementary Material

Electrochemical Performance of Micropillar Array Electrodes in Microflows

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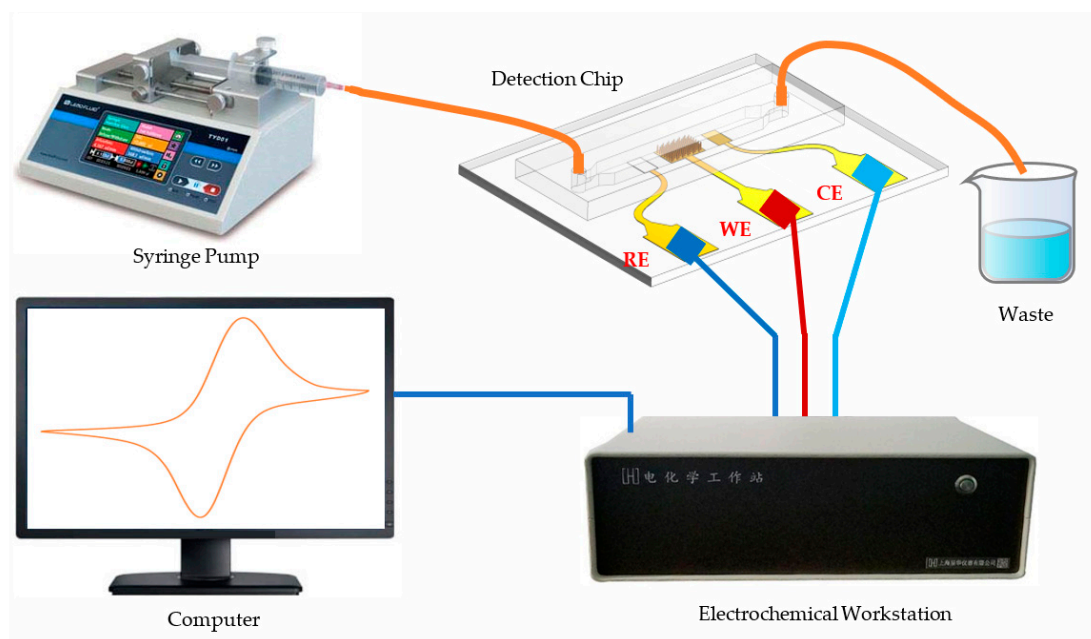


Figure S1. The schematic diagram of the electrochemical detection system.

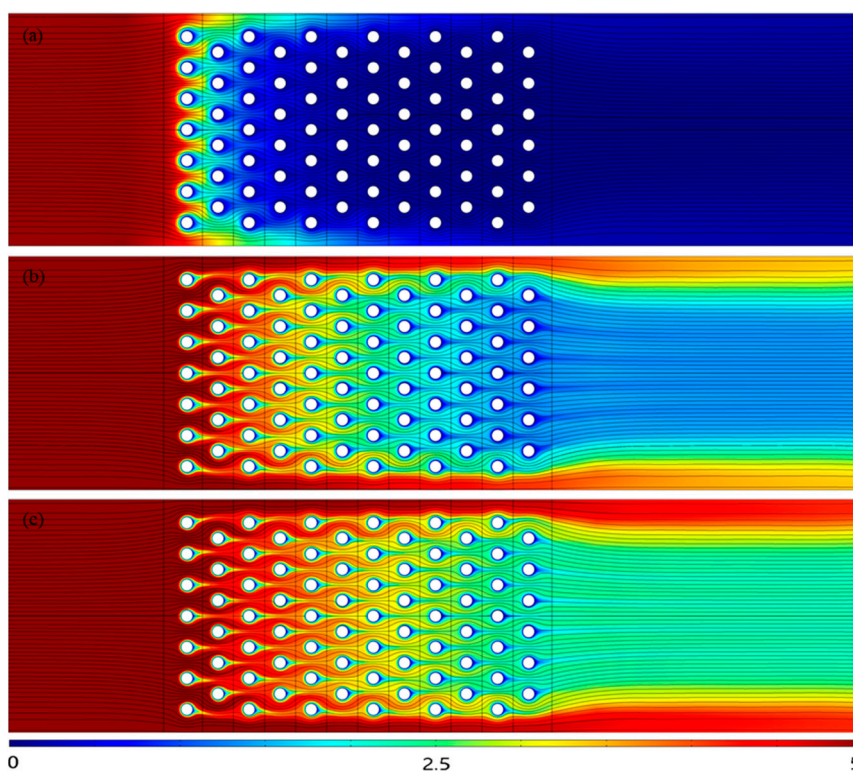


Figure S2. Concentration distribution in μAE with the spacing of 200 μm at different flow rates: (a) $Q=1.5 \mu\text{L/min}$; (b) $Q=15 \mu\text{L/min}$; (c) $Q=30 \mu\text{L/min}$.

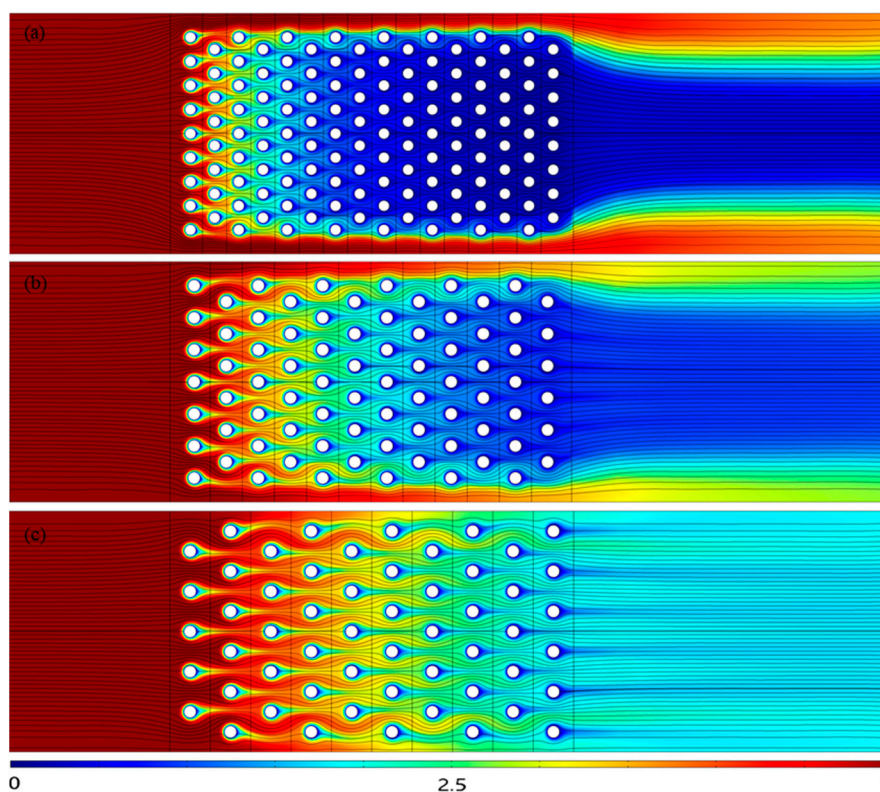


Figure S3. Concentration distribution in μAE with different spacings at the flow rate of 10 $\mu\text{L}/\text{min}$: (a) $d=150\ \mu\text{m}$; (b) $d=200\ \mu\text{m}$; (c) $d=250\ \mu\text{m}$.

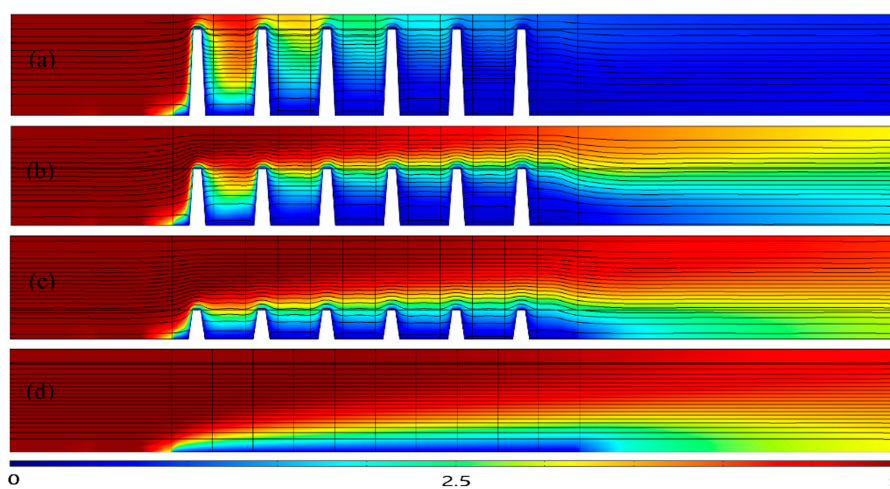


Figure S4. Concentration distribution of the μAE s with micropillars of different heights and the planar electrode at the flow rate of 5 $\mu\text{L}/\text{min}$: (a) $h=300\ \mu\text{m}$; (b) $h=200\ \mu\text{m}$; (c) $h=100\ \mu\text{m}$; (d) planar.

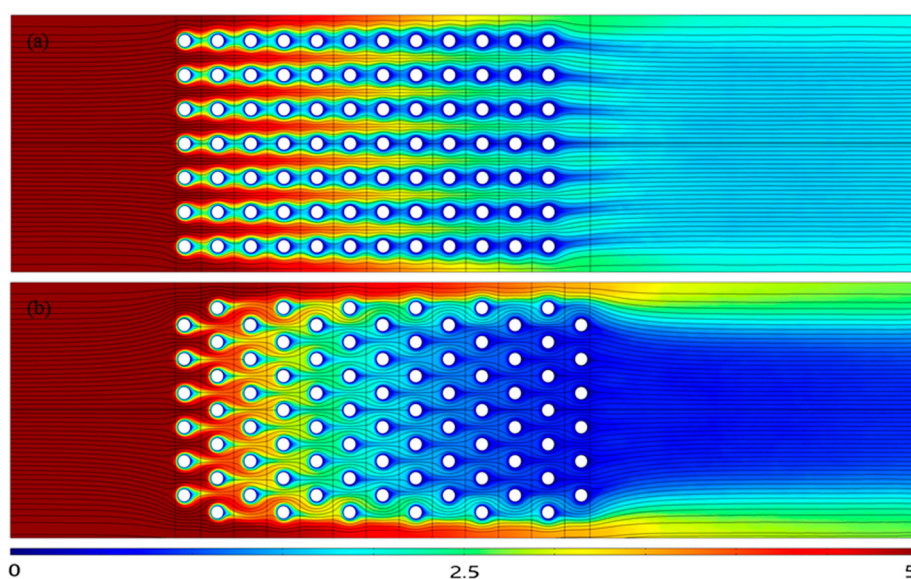


Figure S5. Concentration distribution of the μ AEs in different layouts at the flow rate of 10 μ L/min: (a) Aligned; (b) Staggered.

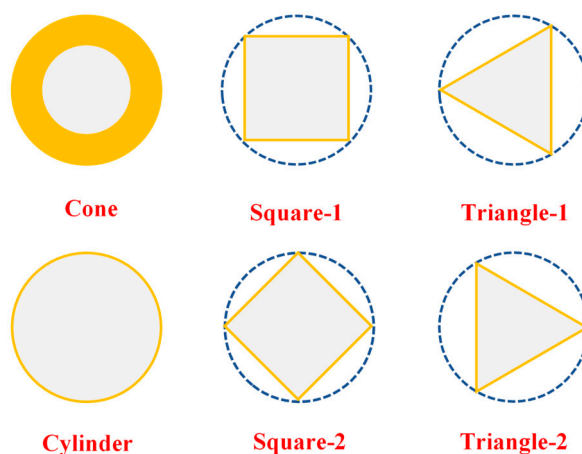


Figure S6. Cross-section of the micropillars in different shapes with the same base radius (50 μ m).

Table S1. Parameters of the working electrode with different shapes.

Parameters	Planar	Cone	Cylinder	Square	Triangle
Projection area $l \times w$ (mm ²)			1.5 $\times$ 2.5		
Height h (μ m)	-		300		
Spacing d (μ m) ¹	-		200		
Number of pillars n	-		78		
Top radius r_t (μ m)	-	25	50	-	-
Base radius (μ m)	-	50	50	-	-
Side length (μ m)	-	-	-	70.71	86.60
Surface area S (mm ²)	3.75	8.82	11.10	10.37	9.83
Area ratio ² S_g	1.0	2.35	2.96	2.77	2.62

¹ Spacing between the centers of two micropillars.

² The ratio of the active area between the μ AE and the planar electrode.

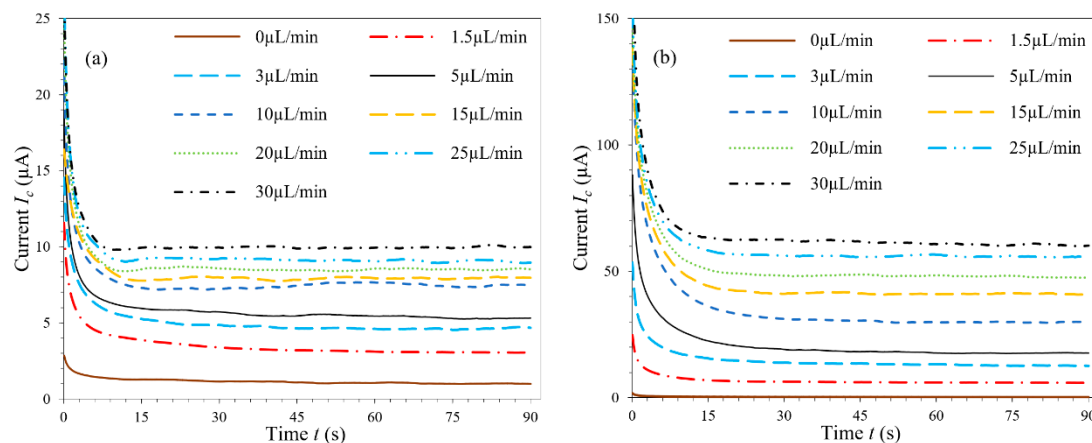


Figure S7. Experimental CA of (a) the planar electrode and (b) μAE200 at different flow rates; In the 5 mM $\text{K}_3[\text{Fe}(\text{CN})_6]/\text{K}_4[\text{Fe}(\text{CN})_6]$ solutions with 0.1 M KCl vs Ag/AgCl.



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