

1 **Supporting Information (SI):**

2 **Impact of Water Quality Parameters on Bacteria Inactivation**  
3 **by Low-Voltage Electroporation: Mechanism and Control †**

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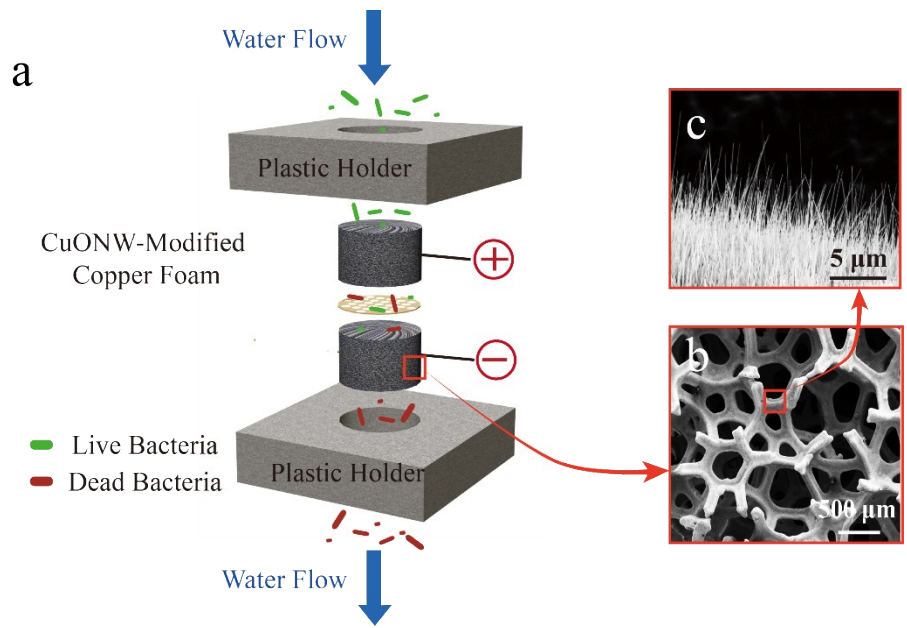
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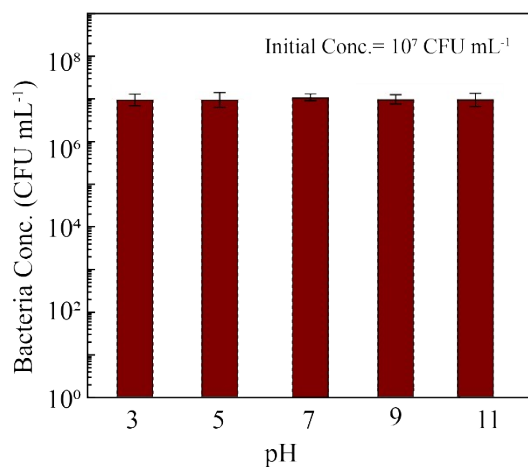
20 **Figure S1. Fabrication and characterization of electroporation–disinfection cells (EDCs) with**

21 **copper oxide nanowire (CuONW)-Cu electrodes. (a)** Schematics showing the construction of an

22 EDC. **(b, c)** Scanning electron microscopy (SEM) image showing **(b)** a modified copper foam, and

23 **(c)** CuONWs on the surface of the copper foam.

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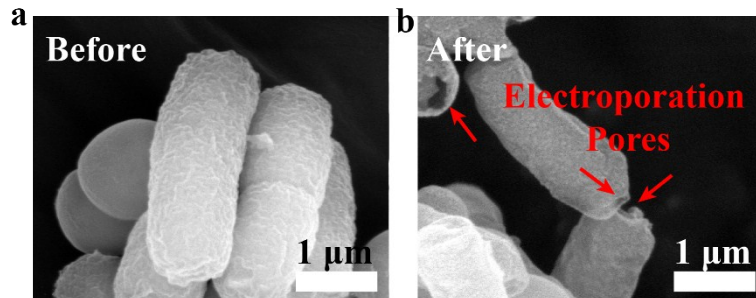
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26 **Figure S2. Bacteria concentration after cultivated in water with different pH from 3 to 11.**

27 The initial bacteria concentration is  $10^7$  CFU mL<sup>-1</sup>, the cultivation time is 2 h and the temperature

28 time is room temperature. The pH ranging from 3 to 11 had no impact on the activity of bacteria.

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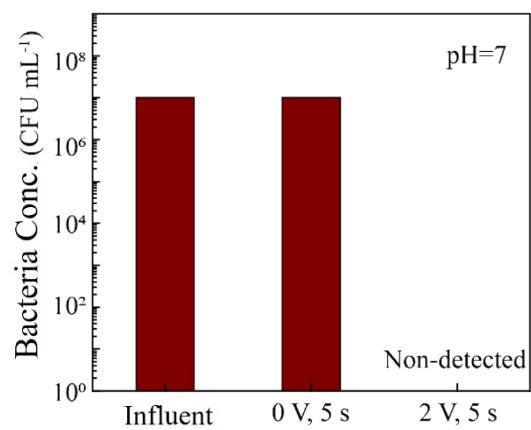
31 **Figure S3. Scanning electron microscope (SEM) images of *E. coli* showing the electroporation**

32 **pores on the membrane after treatment. (a) SEM image of *E. coli* without EDC treatment. (b)**

33 SEM image of *E. coli* after 2 V, 5 s EDC treatment at pH of 7.

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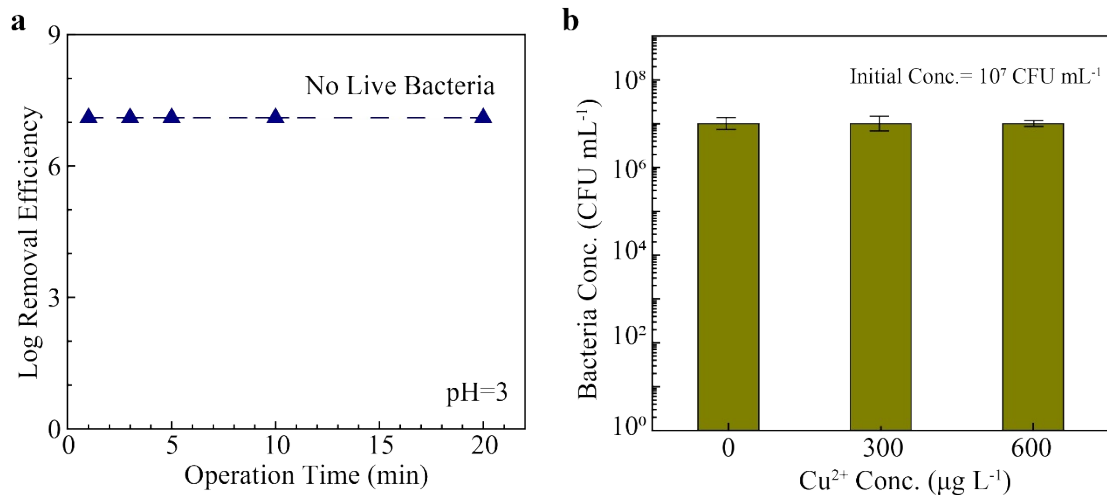


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37 **Figure S4. Electroporation mechanism investigation.** No bacteria were inactivated when flow  
38 through the EDC without applied voltage at 5 s contact time.

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43 **Figure S5. The disinfection efficiency of EDC during continuous operation at pH=3 and the**

44 **contribution of Cu<sup>2+</sup> to the disinfection performance.** The EDC can achieve complete

45 disinfection for 20-min operation at pH=3. A Cu<sup>2+</sup> concentration of 300 μg L<sup>-1</sup> was measured in the

46 effluent. When cultivated the bacteria in the water containing Cu<sup>2+</sup> with the concentration of 0, 300,

47 and 600 μg L<sup>-1</sup> for 6 h, the concentration of live bacteria remained similar. This indicated that the

48 released Cu<sup>2+</sup> will not impact the inactivation performance.

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51 **Experiment method in Supporting Information**

52 **Bacterial Sample Preparation for Scanning Electron Microscopy (SEM).** All bacterial samples  
53 for SEM were harvested by centrifugation at 14500 rpm (17600g) for 15 min at room temperature,  
54 and supernatants were removed. Then bacteria were fixed overnight in the fixative containing 0.1  
55 M phosphate-buffered solution (pH 7.3) and 2% glutaraldehyde at 4 °C and washed with DI water.  
56 Samples were then dehydrated with increasing concentrations of an ethanol solution (50, 70, 90,  
57 and 100%) and dried in 100% tert-butyl alcohol. Samples were dispersed on a metal grid in  
58 preparation for SEM characterization.

59 **Cu<sup>2+</sup> measurement.** The concentration of Cu<sup>2+</sup> in the effluents was measured by ICP-MS (X Series  
60 2). Treated water samples were filtered through 0.45 µm filters and stored in 1 M nitric acid before  
61 measurement.

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