

Supplementary Material

Construction of Rapid Electrochemical Biosensor Consisted of nanozyme/aptamer conjugate for waterborne microcystin detection

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Keywords: Alternating current electrothermal flow; Aptamer; Electrochemical biosensor; Microcystin-LR detection; MnO₂ nanoflowers;.

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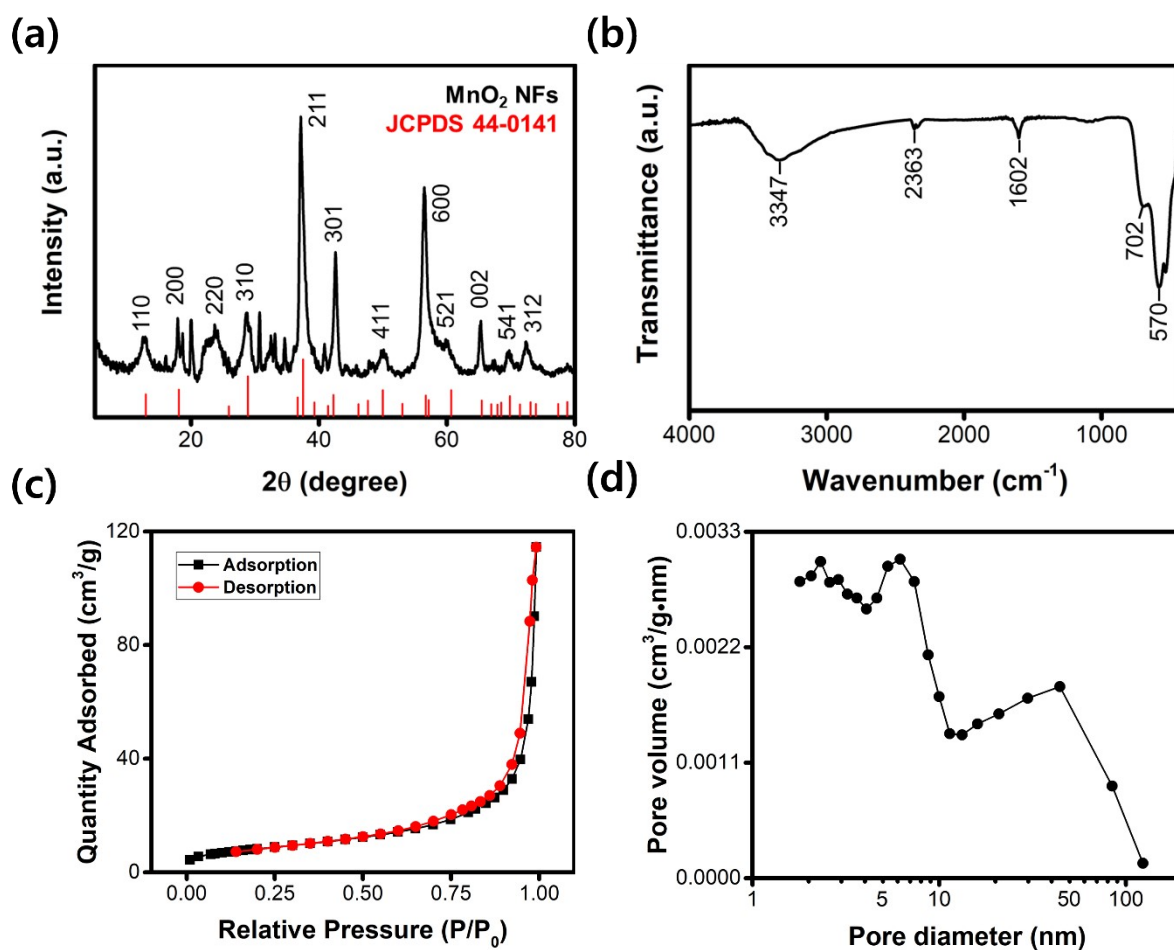


Fig. S1 (a) XRD pattern, (b) FT-IR spectra, (c) nitrogen adsorption–desorption isotherms, and (d) pore size distribution of MnO₂ NFs.

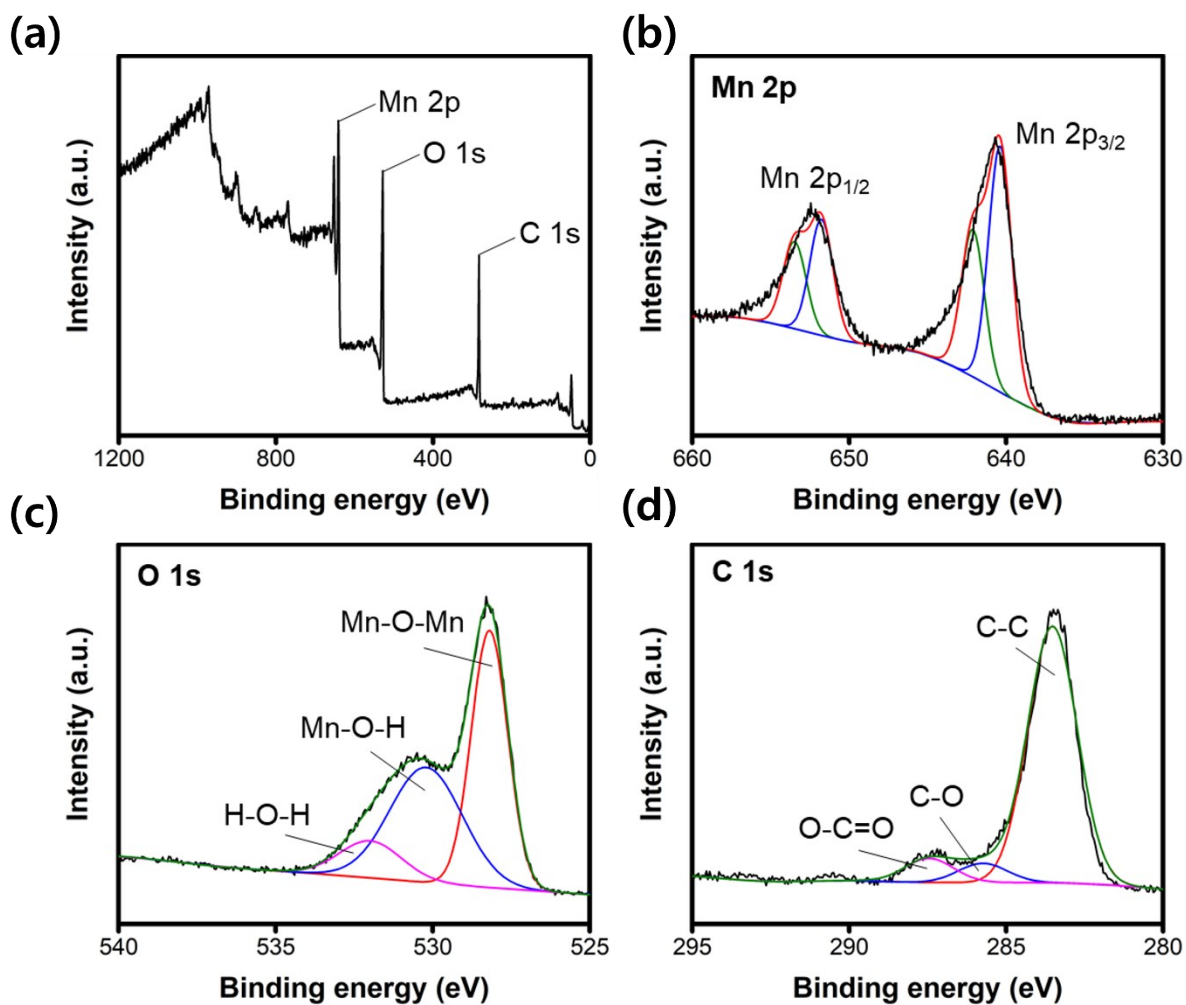


Fig. S2 (a) XPS full scan spectrum of MnO₂ NFs, and high-resolution XPS spectra of (b) Mn 2p, (c) O 1s, and (d) C 1s. In Mn 2p spectra, the blue and green lines represent Mn³⁺ and Mn⁴⁺, respectively.

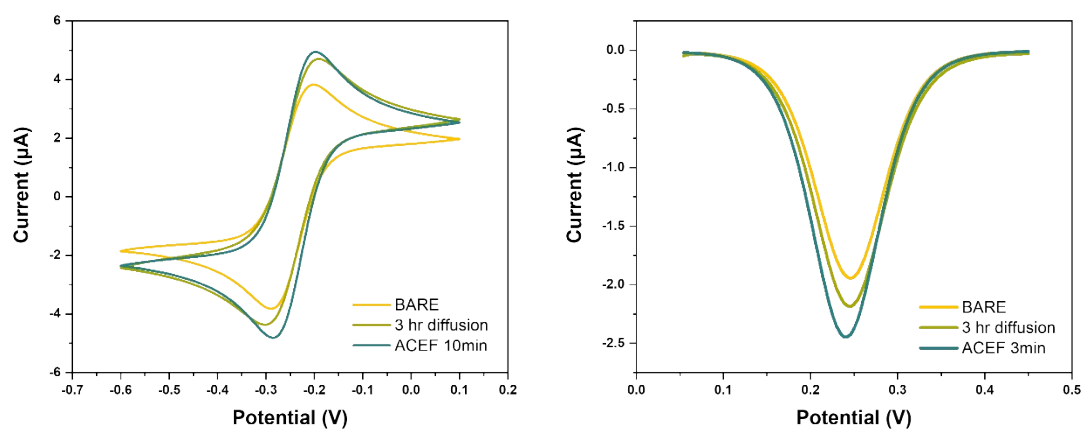


Fig. S3 (a) CV of bare (yellow line), MC-LR/MnO₂/MC-LR Aptamer after 3 h reaction by diffusion (light green line), and MC-LR/MnO₂/MC-LR Aptamer after 10 min reaction with ACEF (blue-green line), (b) DPV of bare (yellow line), MC-LR/MnO₂/MC-LR Aptamer after 3 h reaction by diffusion (light green line), and MC-LR/MnO₂/MC-LR Aptamer after 10 min reaction with ACEF (blue-green line).

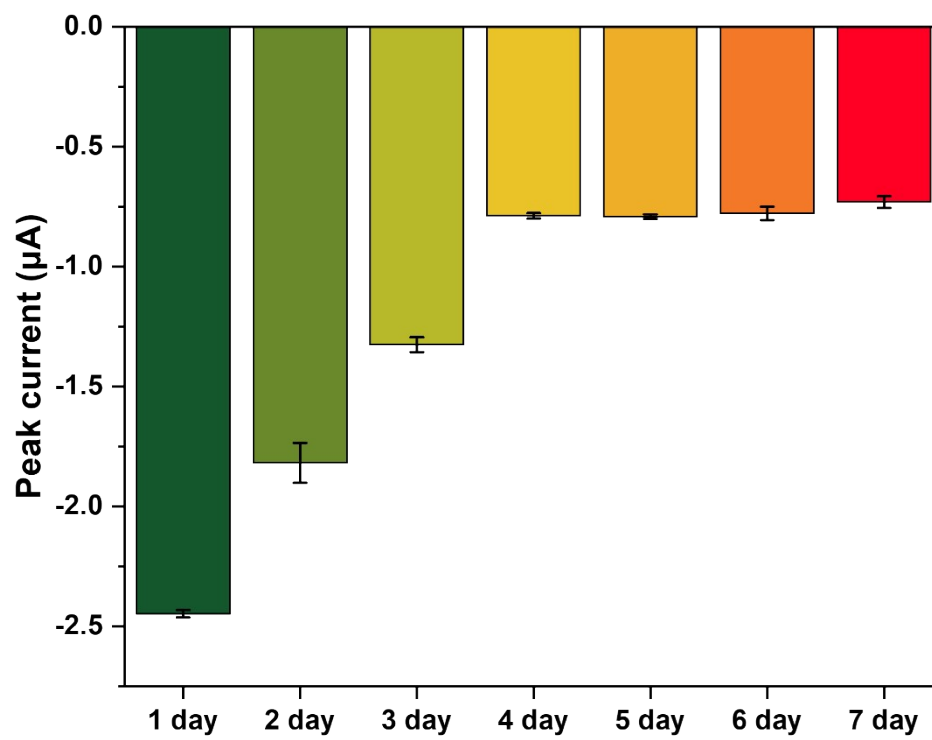


Fig. S4 Shelf-life test of the electrochemical MC-LR biosensor (in freshwater).

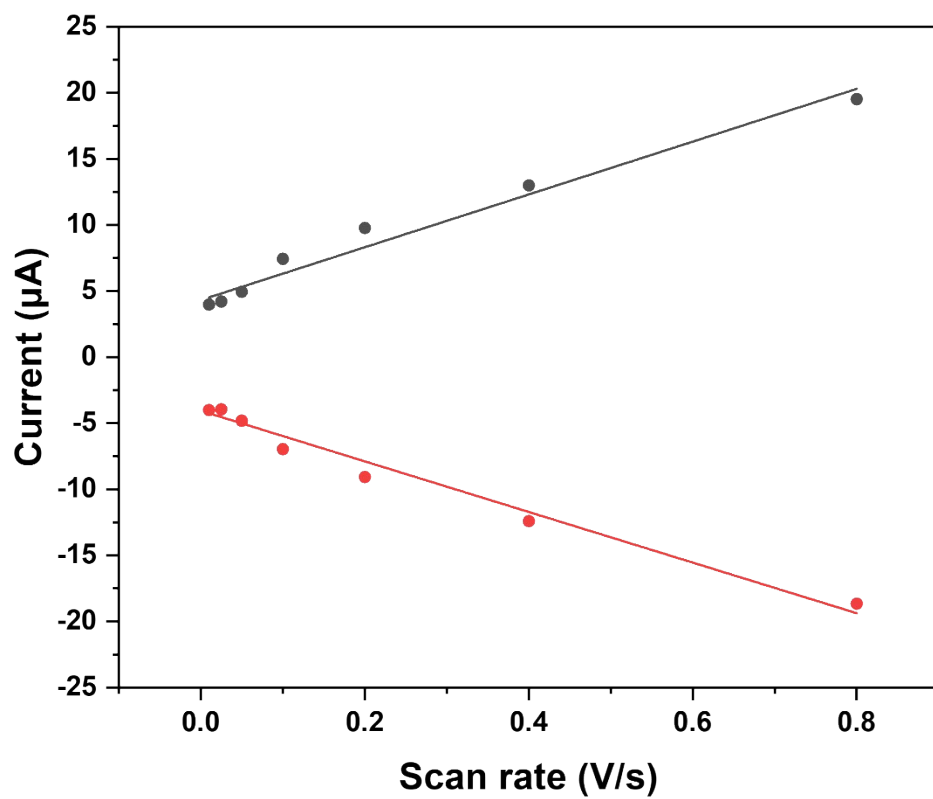


Fig. S5 Linear regression between the current at 0.2 V, 0.3 V and scan rate (MC-LR/MnO₂/MC-LR Aptamer)

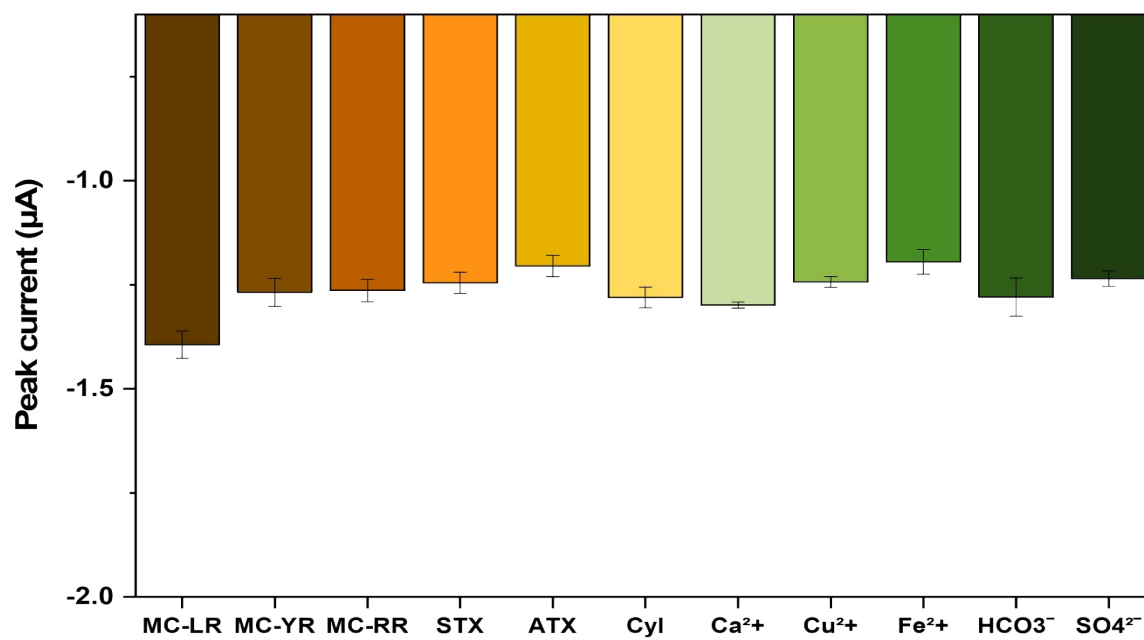


Fig. S6 Peak current at DPV graph based on selectivity at 100 pg/mL MC-YR, MC-RR, ATX, STX, cylindrospermopsin and other inorganic ions in freshwater.

Table S1 Encapsulation yields of microcystin aptamers, with and without amine modifications, conjugated to the MnO₂ NFs.

Aptamer	Sequence	Encapsulation yields (%)
MC-LR	5' - GGC GCC AAA CAG GAC CAC CAT GAC AAT TAC CCA TAC CAC CTC ATT ATG CCC CAT CTC CGC /3AmMC6T/ -3'	89.49 ± 3.68
MC-LR control	5' - GGC GCC AAA CAG GAC CAC CAT GAC AAT TAC CCA TAC CAC CTC ATT ATG CCC CAT CTC CGC - 3'	79.11 ± 1.00