

Supplementary material

Towards physicochemical and biological effects on activated sludge performance and activity recovery of damaged sludge by exposing to CeO₂ nanoparticles in sequencing batch reactors

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Figure Captions

Figure S1. The magnified SEM images of the activated sludge from R4. (The yellow circles in Figure S1 a, b, c, d represent the filamentous bacteria, spherical bacteria, rod-shaped bacteria and the attached CeO₂ NPs, respectively.).

Figure S2. Relative LDH release during one cycle after 1-d and 10-week exposure to CeO₂ NPs at different concentrations, respectively. Error bars represent standard deviations of triplicate measurement.

Figure S3. The energy spectrum of activated sludge within 2-week recovery time relieved from the 10-week exposure to 0.1 (a), 1 (b), and 10 (c) mg/L CeO₂ NPs.

Figure S4. Heat-map of the four reactors within 2-week recovery time relieved from the 10-week exposure to different CeO₂ NPs concentration.

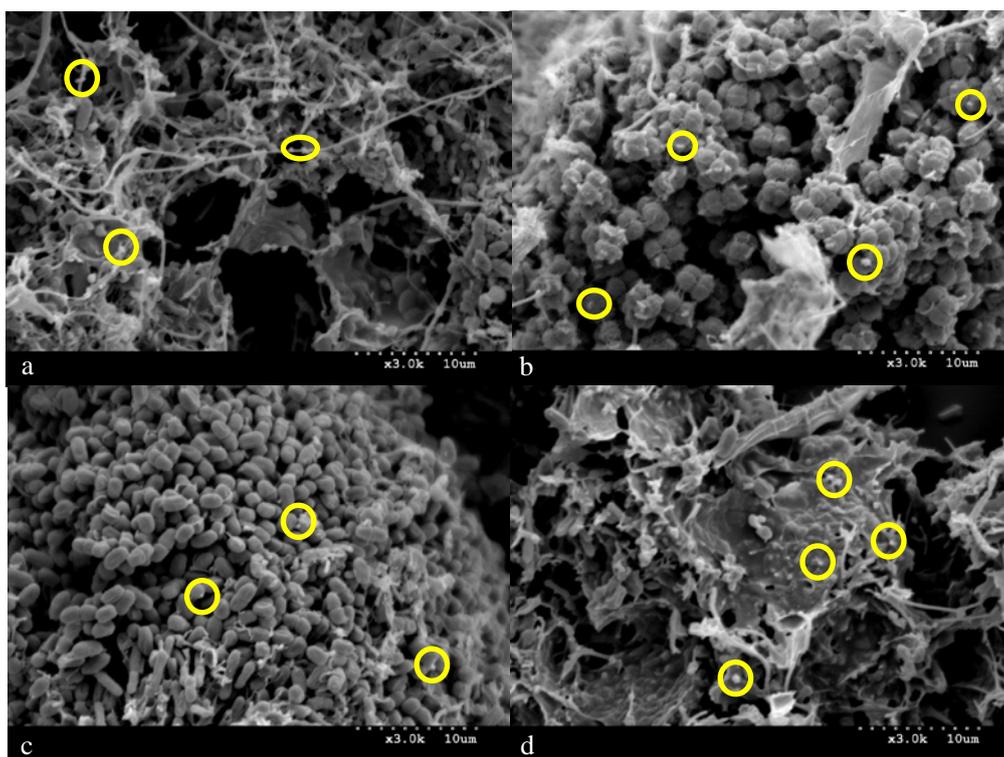


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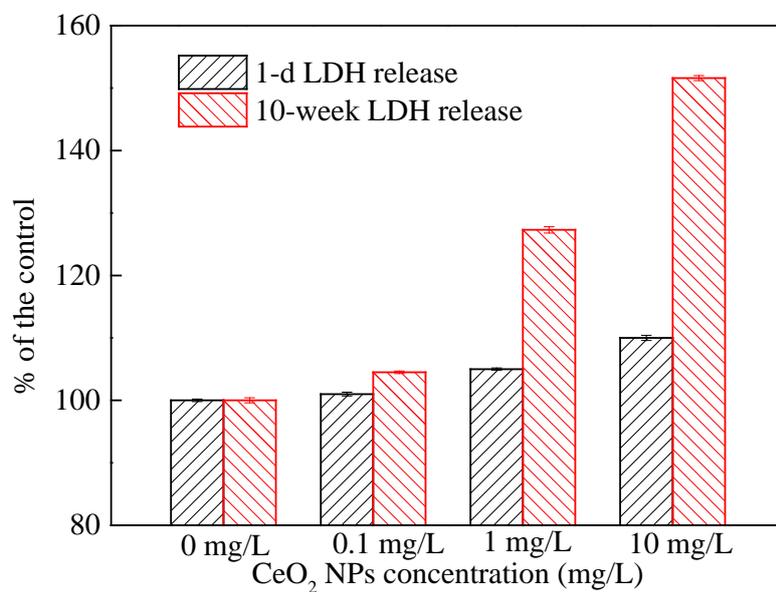
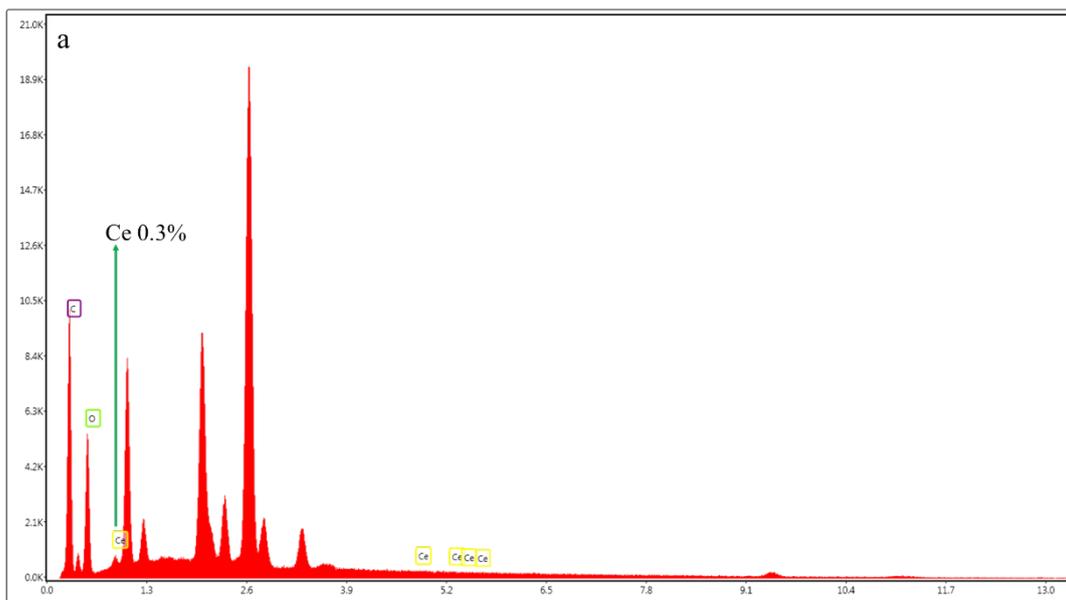
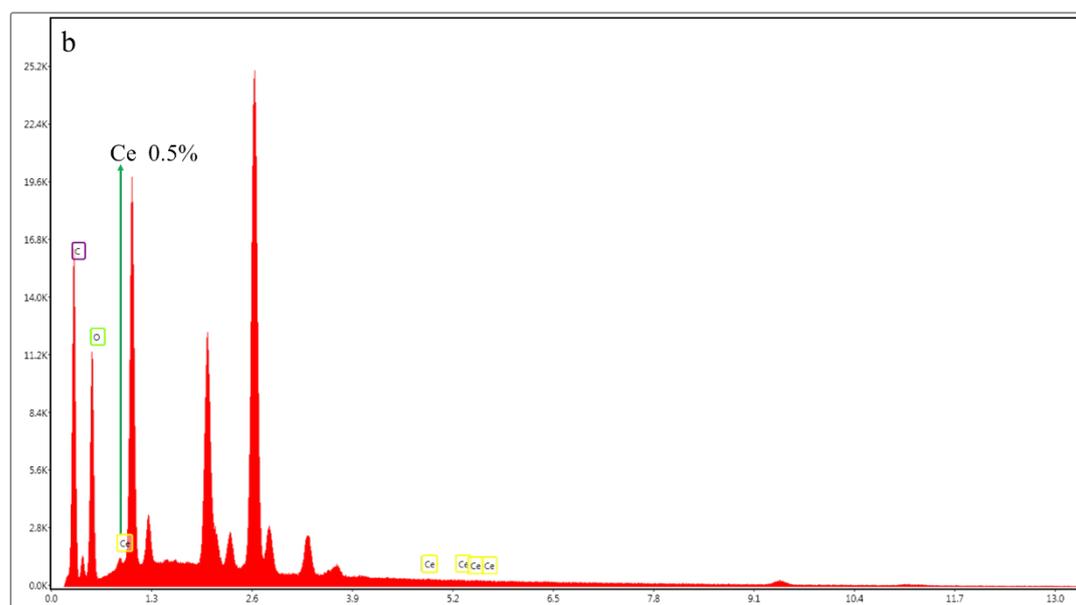


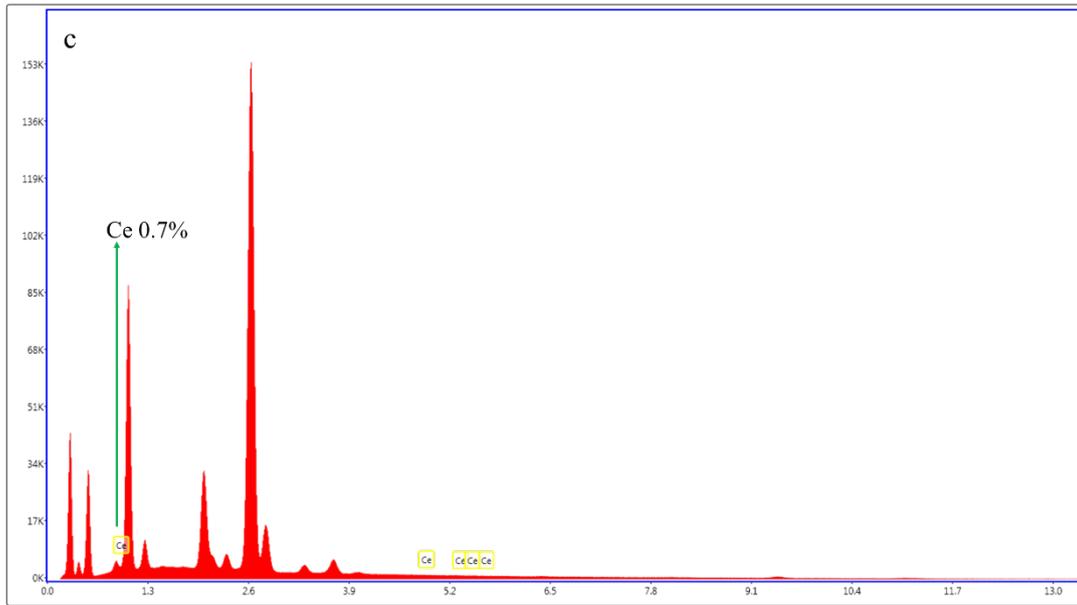
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(a)



(b)



(c)

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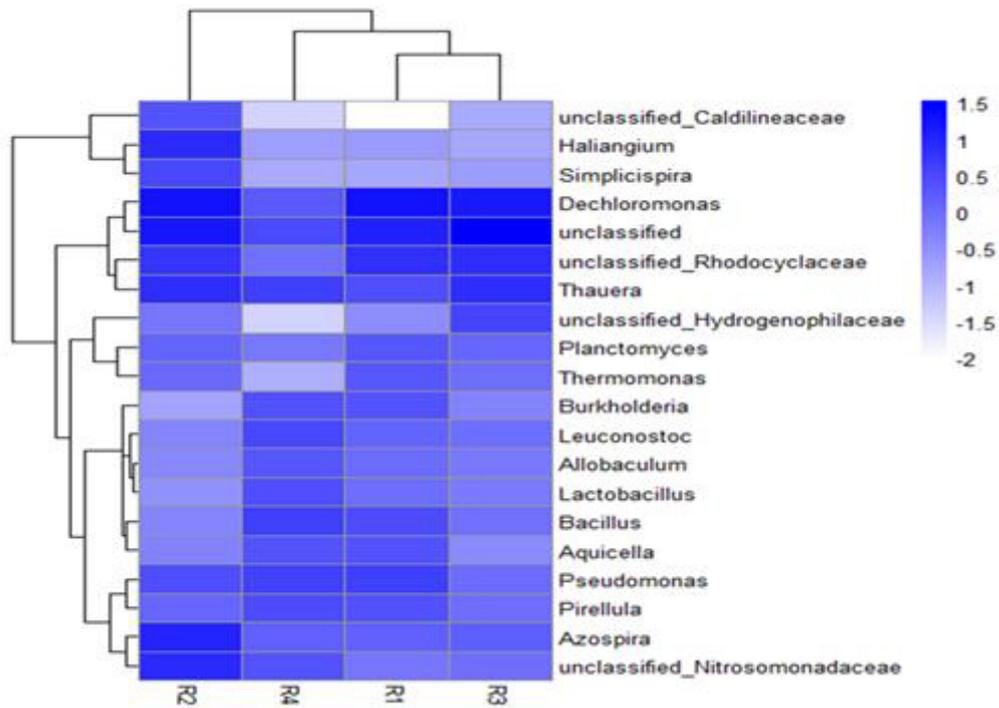


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