Protection of *Shewanella oneidensis* MR-1 by Manganese Ferrite Nanoparticles during Chromate Bio-reduction

Diana S. Raie,^{a,b} Ioannis Tsonas,^c Stefanos Mourdikoudis,^{a,b} Evangelia Delli,^d Antonis Makridis,^d Lena Ciric,^e Nguyen Thi Kim Thanh^{a,b*}

^a Biophysics Group, Department of Physics and Astronomy, University College London (UCL), London, WC1E

6BT, UK, *E-mail: ntk.thanh@ucl.ac.uk; Web: http://www.ntk-thanh.co.uk

^b UCL Healthcare Biomagnetics and Nanomaterials Laboratories, 21 Albemarle Street, London, W1S 4BS, UK

^c UCL Electronic and Electrical Engineering, UCL, Gower Street, London, WC1E 7JE, UK

^d Laboratory of Advanced Materials and Devices, Department of Physics, Aristotle University of Thessaloniki,

54124 Thessaloniki, Greece

^e Healthy Infrastructure Research Group, Department of Civil, Environmental & Geomatic Engineering, UCL,

Gower Street, WC1E 6BT London, UK

Both ICP-AES and colourimetric methods can be used for iron quantification. ICP-AES is not always available; therefore a colorimetric method was used for routine iron quantification and ICP-AES was used for a more precise elemental analysis when accessible.



Figure S1: Viability of *S. oneidensis* MR-1 in response to different concentrations of $Mn_{0.2}Fe_{2.8}O_4$ NPs

We found 10 \pm 4% of our untreated bacterial cells were dead, which was attributable to reaching the stationary stage of bacterial growth.¹ During the stationary phase, bacterial cells can survive under stress conditions without active growth due to the depletion of nutrients,² and adapt from growing to a maintenance state.³ So, such bacterial cells can persist under stress conditions.³

References:

- Hau HH, Gilbert A, Coursolle D, Gralnick JA. Mechanism and consequences of anaerobic respiration of cobalt by Shewanella oneidensis strain MR-1. Appl Environ Microbiol [Internet].
 2008;74(22):6880–6. Available from: https://journals.asm.org/doi/10.1128/aem.00840-08
- Jaishankar J, Srivastava P. Molecular basis of stationary phase survival and applications. Front Microbiol [Internet]. 2017;8:2000. Available from: https://www.frontiersin.org/journals/microbiology/articles/10.3389/fmicb.2017.02000/full
- Gonzalez JM, Aranda B. Microbial growth under limiting conditions-future perspectives. Microorganisms [Internet]. 2023;11(7):1641. Available from: https://www.mdpi.com/2076-2607/11/7/1641/review_report