

Supporting Material

for

Inactivation of MS2 bacteriophage by titanium dioxide nanoparticles in the presence of quartz sand with and without ambient light

by

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The supporting information provides supplemental material as well as additional figures that support the main text.

1. UV-Vis Absorbance Spectroscopy of TiO₂ NPs

The concentration of TiO₂ NPs was monitored using a UV-visible spectrophotometer at 287 nm. The UV-Vis absorption spectra of the TiO₂-NPs using different concentrations in PBS solution and the calibration curve are presented in Figs S1 and S2, respectively.

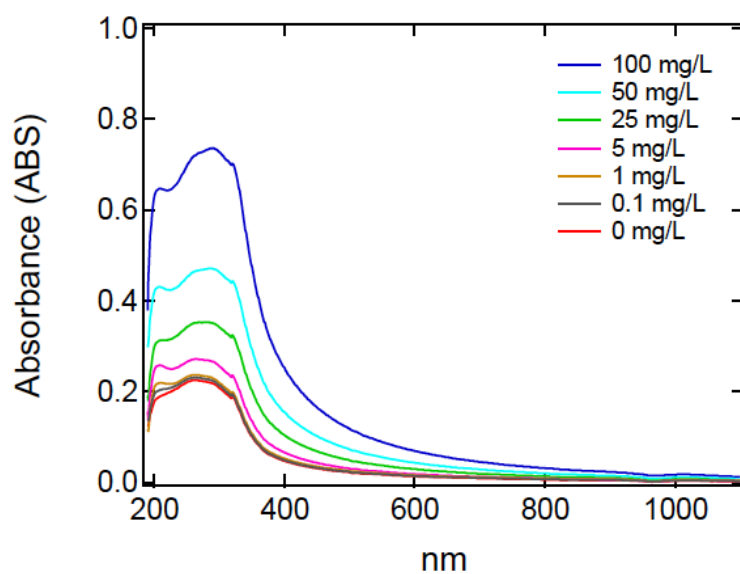


Fig. S1. The UV-Vis absorption spectra of the TiO₂-NPs using different concentrations in PBS solution.

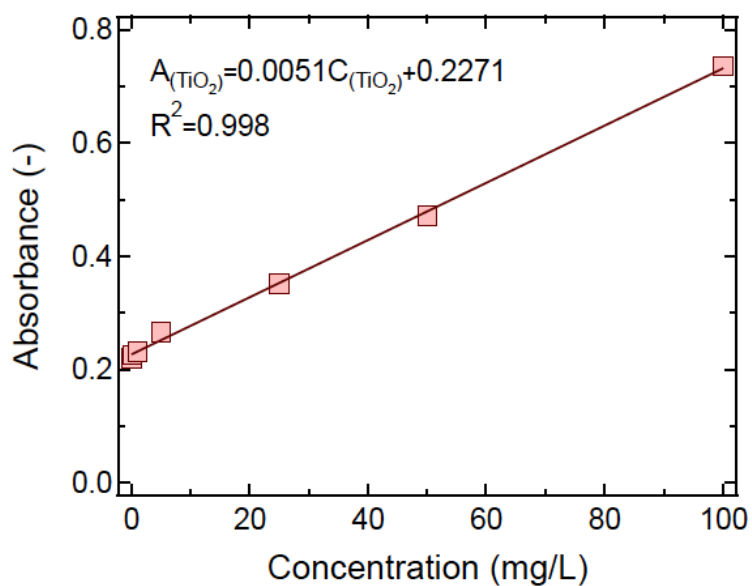


Fig. S2. Concentration calibration curve for TiO₂.

2. TiO₂ NP Size Stability Test

In order to characterize the size stability of the TiO₂ NP suspensions used in this study, the average TiO₂ aggregate size, and size distribution in ddH₂O was measured using dynamic light scattering (DLS) (Zetasizer Nano-ZS analyzer, Malvern Instrument Inc., U.K.) over a 7-day time period. Intensity autocorrelation functions were converted to intensity-weighted TiO₂ aggregate hydrodynamic diameter distributions based on the Einstein Stokes relationship for spherical particles [1, 2]. As seen in Fig. S3, the variation of the hydrodynamic diameter of the TiO₂ NPs in ddH₂O solution was not very significant over the period of 7 days, indicating the formation of quite stable aggregates with a mean hydrodynamic diameter of 180±31 nm, which is comparable to previously reported hydrodynamic diameters of TiO₂ NP aggregates [3, 4].

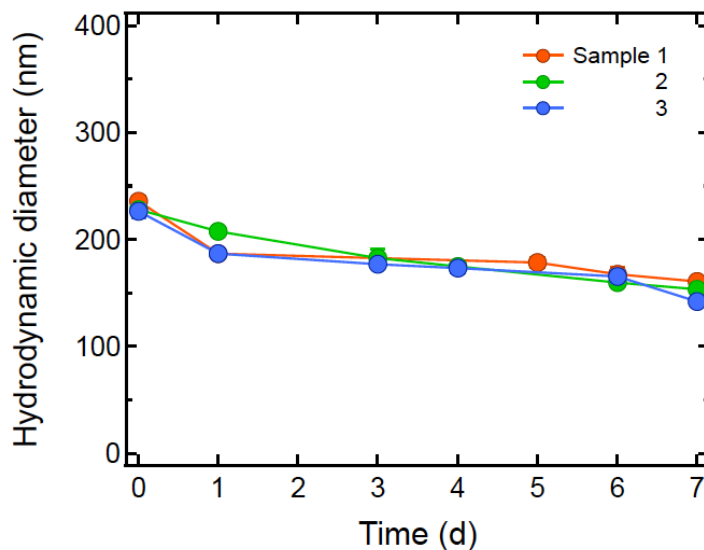


Fig. S3. The size distribution of TiO₂ NP aggregates in ddH₂O.

References

- [1]. R. A. French, A. R. Jacobson, B. Kim, S. L. Isley, R. L. Penn, P. C. Baveye, Influence of ionic strength, pH, and cation valence on aggregation kinetics of titanium dioxide nanoparticles. *Environ. Sci. Technol.* 43 (2009) 1354–1359.
- [2]. T. Phenrat, H.-J. Kim, F. Fagerlund, T. Illangasekare, R. D. Tilton, G. V. Lowry, Particle size distribution, concentration, and magnetic attraction affect transport of polymer-modified FeO nanoparticles in sand columns. *Environ. Sci. Technol.* 43 (13) (2009) 5079–5085.
- [3]. B. Mukherjee, J. W. Weaver, Aggregation and charge behavior of metallic and nonmetallic nanoparticles in the presence of competing similarly-charged inorganic ions. *Environ. Sci. Technol.* 44 (2010) 3332–3338.
- [4]. G. Chen, X. Liu, C. Su, Transport and Retention of TiO₂ Rutile Nanoparticles in Saturated Porous Media under Low-Ionic-Strength Conditions: Measurement and Mechanisms. *Langmuir.* 27 (2011) 5393–5402.