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Supporting Information (SI)

Dual-Enhanced Photocatalytic Activity of Fe-Deposited Titanate Nanotubes Used for Simultaneous Removal of As(III) and As(V)

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Table S1 Parameters of isotherm models for As(V) adsorption by TNTs and Fe-TNTs.
Adsorption isotherms of As(V) by unmodified TNTs and Fe-TNTs

Adsorption isotherm experiments were conducted by varying the As(V) concentration from 1 to 50 mg L\textsuperscript{-1} at pH 3.0 and the adsorbent dosage was 0.2 g L\textsuperscript{-1}. And then the mixture was shaken at 25 °C and 200 rpm for 6 h. After centrifugation and filtration, the As concentration of the sample was immediately measured using AFS. The isotherm results are analyzed using the Langmuir and two-site Langmuir models expressed as\textsuperscript{2,3}

\[
Q_e = \frac{Q_m b C_e}{1 + b C_e}
\]  
(S1)

and

\[
Q_e = \frac{Q_1 b_1 C_e}{1 + b_1 C_e} + \frac{Q_2 b_2 C_e}{1 + b_2 C_e}
\]  
(S2)

where \(Q_e\) (mg g\textsuperscript{-1}) is the As(V) adsorption capacity at equilibrium, \(Q_m\) (mg g\textsuperscript{-1}) is the maximum adsorption capacity, \(b\) (L mg\textsuperscript{-1}) is the Langmuir constant related to the affinity of binding sites of the adsorbent. \(Q_1\) (mg g\textsuperscript{-1}) and \(Q_2\) (mg g\textsuperscript{-1}) are the maximum adsorption capacities, and \(b_1\) (L mg\textsuperscript{-1}) and \(b_2\) (L mg\textsuperscript{-1}) are the affinity coefficients of site 1 and site 2 of the adsorbent. The total maximum adsorption capacity is obtained by summation of \(Q_1\) and \(Q_2\).

The Langmuir isotherm model provided a good fit to the adsorption of As(V) onto TNTs, with a high correlation coefficient of 0.99 (Table S1). Even so, the two-site Langmuir model provided a slightly closer fit to the isotherm data, with a correlation coefficient of 0.98. One site possessed a capacity of 31.66 mg g\textsuperscript{-1} which was attributed to TNTs given that the value was similar to that on unmodified TNTs (27.54 mg g\textsuperscript{-1}). The other site with a higher adsorption capacity of 57.06 mg g\textsuperscript{-1} was attributed to
Moreover, the total As(V) adsorption capacity on Fe-TNTs was 88.72 mg g\(^{-1}\), which was much larger than that on TNTs, indicating that Fe deposition greatly enhanced the As(V) adsorption capacity on TNTs.

References

