

Supplementary Material (ESI) for *Nanoscale*

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Supplementary data

A General Procedure to Synthesize Highly Crystalline Metal Oxide and Mixed Oxide Nanocrystals in Aqueous Medium and Photocatalytic Activity of Metal/Oxide Nanohybrids

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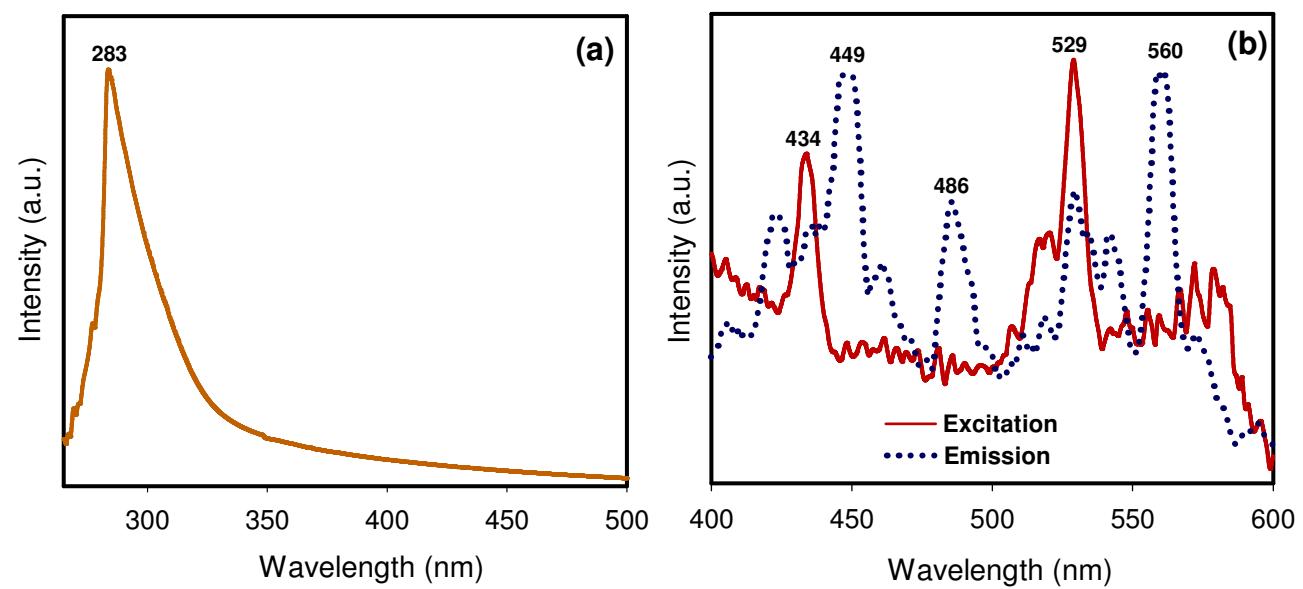


Figure S1. (a) UV-visible adsorption and (b) photoluminescence (PL) spectra of 5.0 mol% Eu^{3+} : NdVO_4 nanorods dispersion in water.

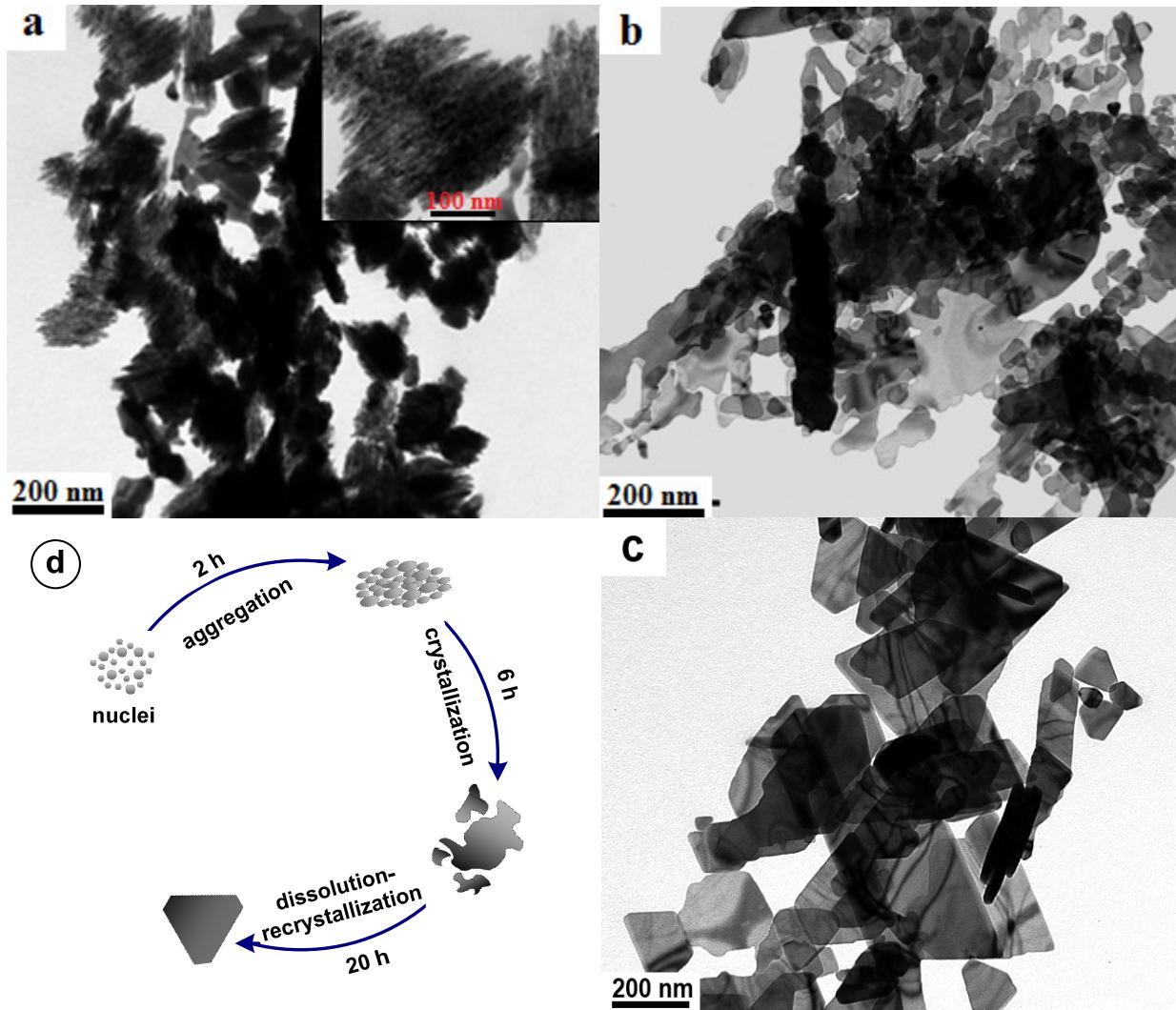


Figure S2. TEM images of typical $\text{La}_2(\text{MoO}_4)_3$ nanocrystals synthesized hydrothermally at 180 °C for the different reaction times: (a) 2 h, (b) 6 h, and (c) 20 h. (d) Schematic illustration of the proposed growth mechanism of the $\text{RE}_2(\text{MoO}_4)_3$ nanosheets.

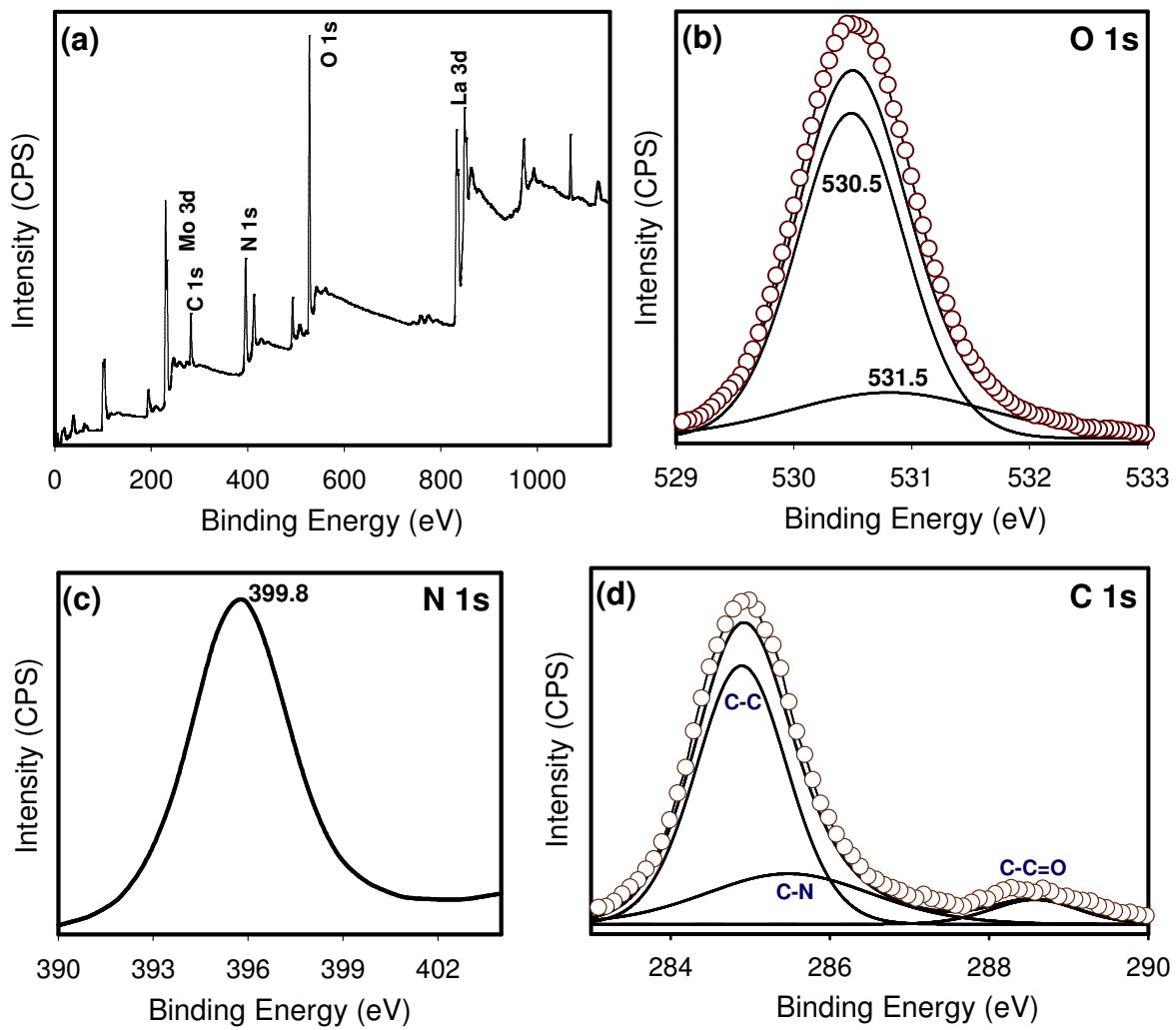


Figure S3. (a) Survey XPS spectrum and high-resolution (b) O 1s, (c) N 1s, (d) C 1s XPS spectra of AHA-capped $\text{La}_2(\text{MoO}_4)_3$ nanosheets.

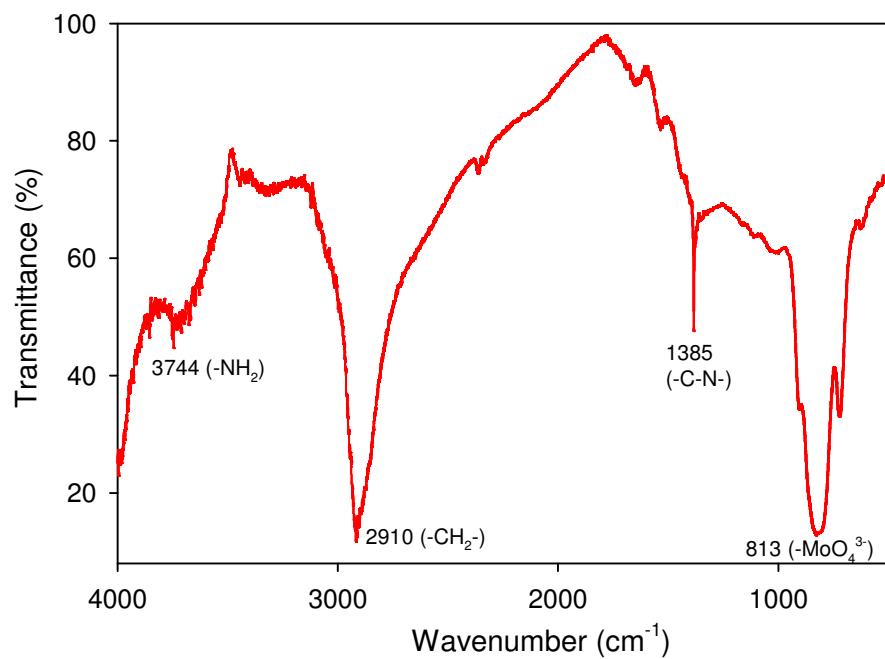


Figure S4. FTIR spectrum of 6-aminohexanoic acid-capped $\text{La}_2(\text{MoO}_4)_3$ nanosheets.

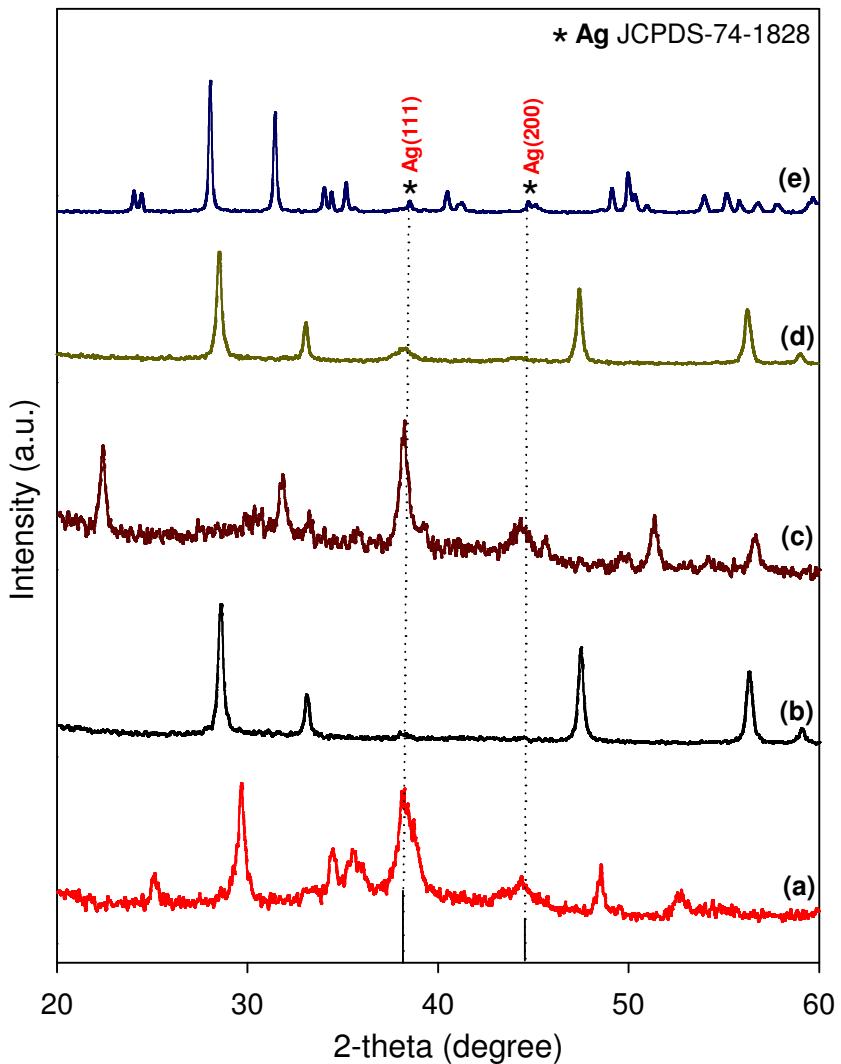


Figure S5. XRD patterns of the synthesized 10.0 wt.% Ag/oxide hybrid NC samples: (a) Ag/TiO₂ nanobelts, (b) Ag/In₂O₃ nanorods, (c) Ag/Y₂O₃ nanorods, (d) Ag/ZrO₂ nanorods, (e) Ag/CeO₂ nanocubes. The marked with “*” is indexed to the deposited face-center-cubic (*fcc*) metallic Ag structure; and the other remained peaks are contributed to the corresponding oxide structure.

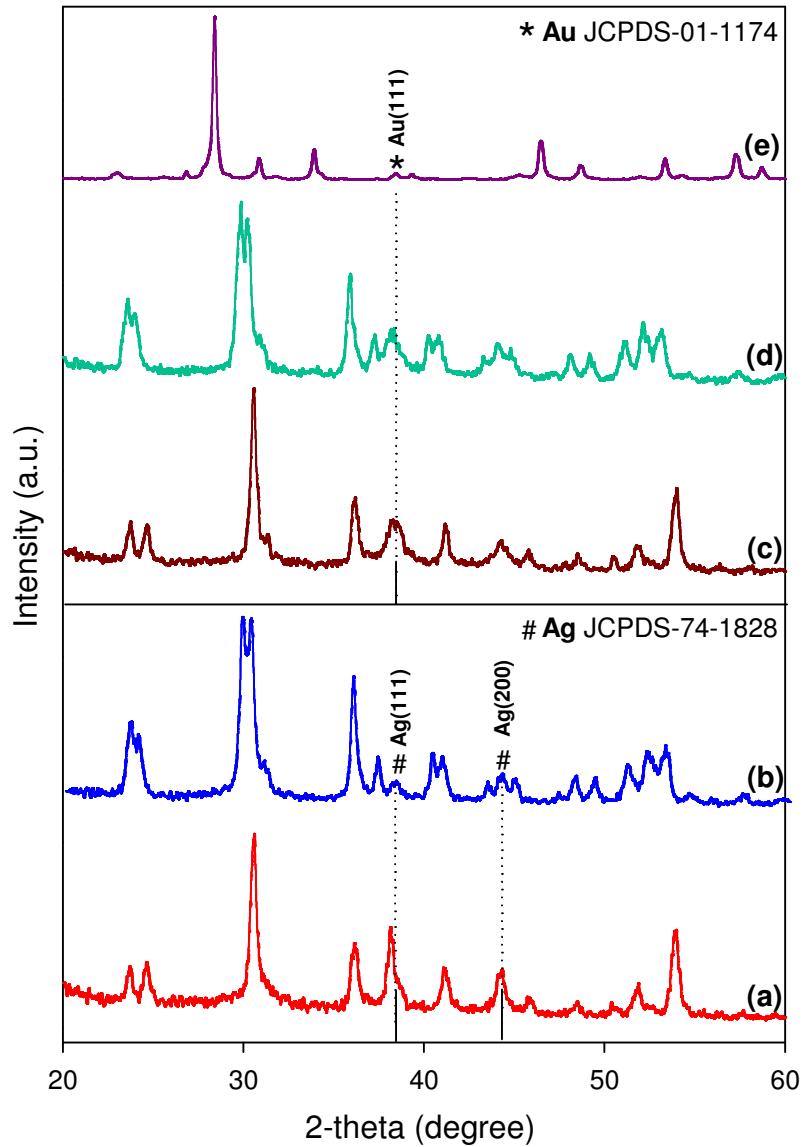


Figure S6. XRD patterns of the synthesized 10.0 wt.% Ag/mixed oxide and 10.0 wt.% Au/mixed oxide NC samples: (a) Ag/CoWO₄, (b) Ag/MnWO₄, (c) Au/CoWO₄, (d) Au/MnWO₄, (e) Au/La₂(MoO₄)₃. The marked with “*” and “#” are indexed to deposited face-center-cubic (*fcc*) metallic Ag and Au structures, respectively, and the other remained peaks are contributed to the corresponding mixed oxide structure.

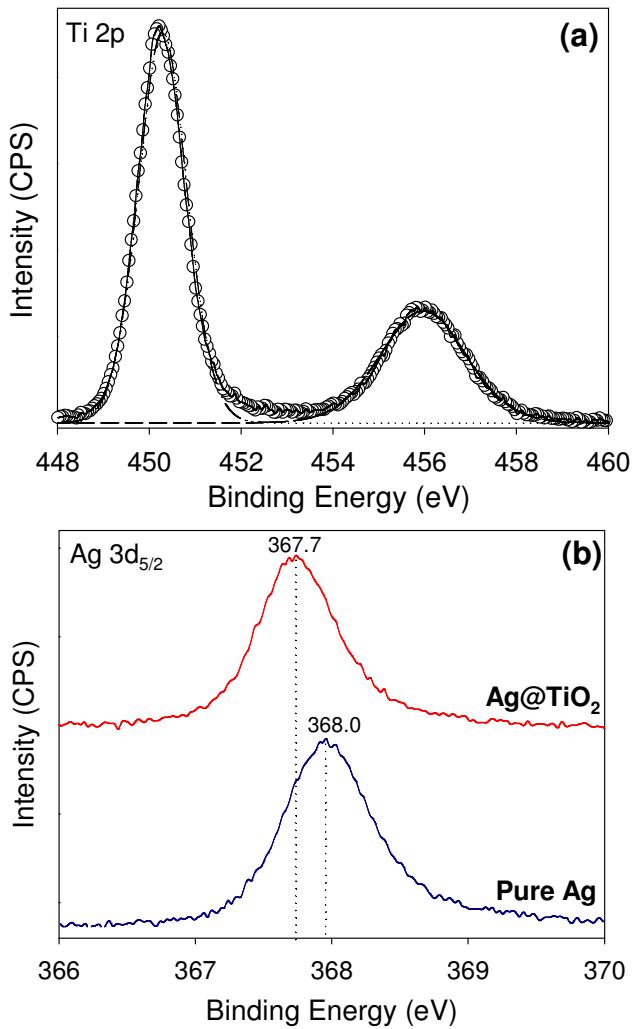


Figure S7. (a) Ti 2p XPS spectra of 9.5 wt.% Ag/TiO₂ nanohybrids; (b) Ag 3d XPS spectra of pure 9.5 wt.% Ag/TiO₂ nanohybrids and pure Ag nanoparticles.

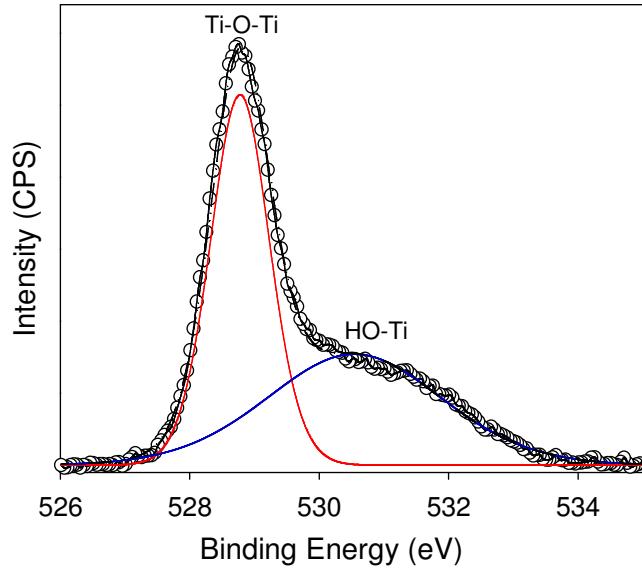


Figure S8. O 1s XPS spectrum of 9.5 wt.% Ag/TiO₂ nanohybrids.

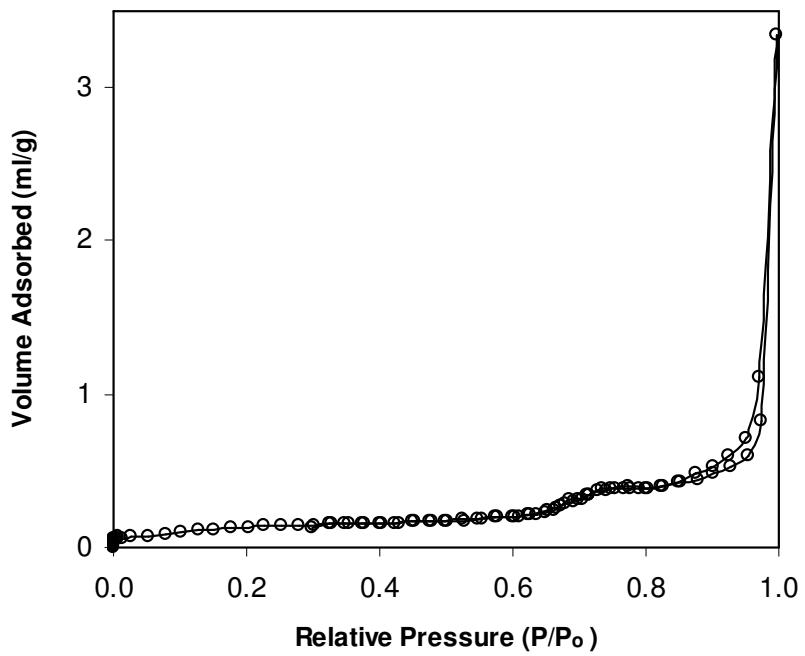


Figure S9. Nitrogen adsorption-desorption of 9.5 wt.% Ag@TiO₂ hybird nanobelts after annealing at 550 °C for 3 h.

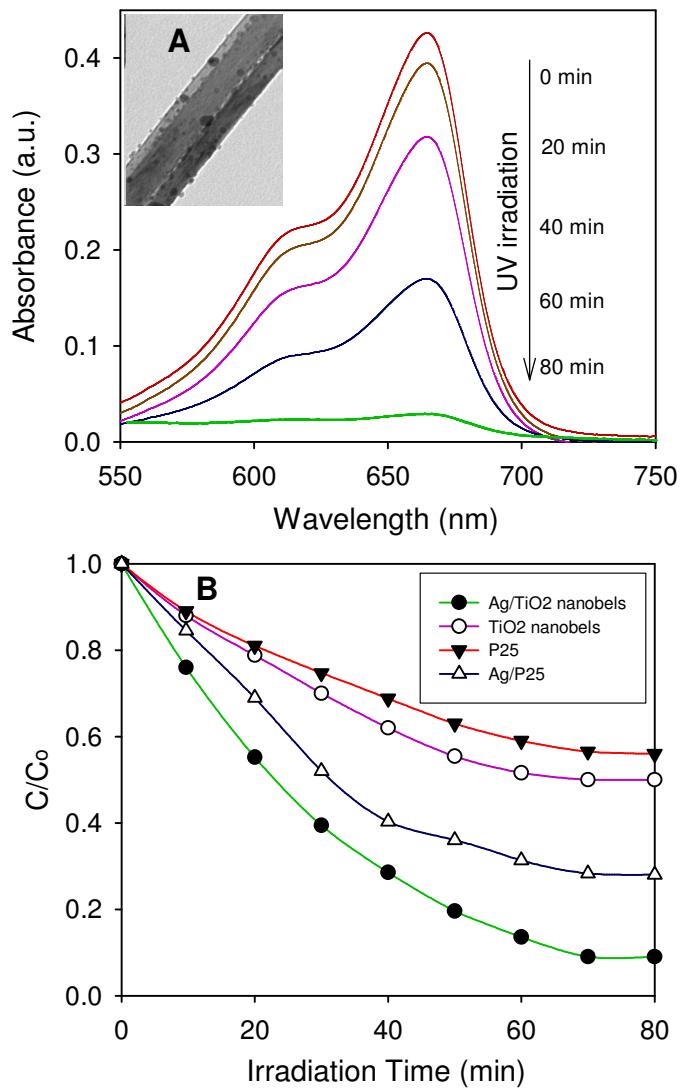
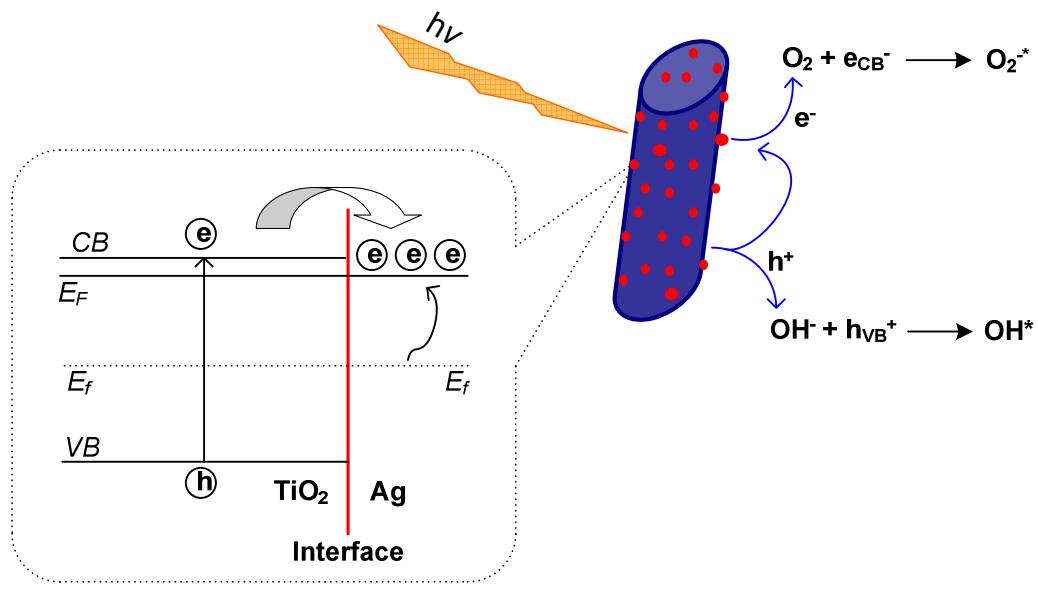


Figure S10. (A) UV-vis absorption spectra of a methylene blue (MB) solution as a function of irradiation time in the presence of 9.5 wt.% Ag/TiO₂ hybrid NC catalyst and (B) comparison of the MB photodegradation using TiO₂ nanobelts, commercial P25, 9.5 wt.% Ag/TiO₂ hybrid NCs, and 9.5 wt.% Ag/P25 as photocatalysts.



Scheme S1. Proposed band structure and photocatalytic mechanism for light-induced charge separation in Ag/TiO_2 hybrid nanobelts.