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Electronic Supplementary Information

Hierarchical Yolk–shell Layered Potassium Niobate for Tuned pH-Dependent Photocatalytic H_2 Evolutions

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Additional Figures and Captions

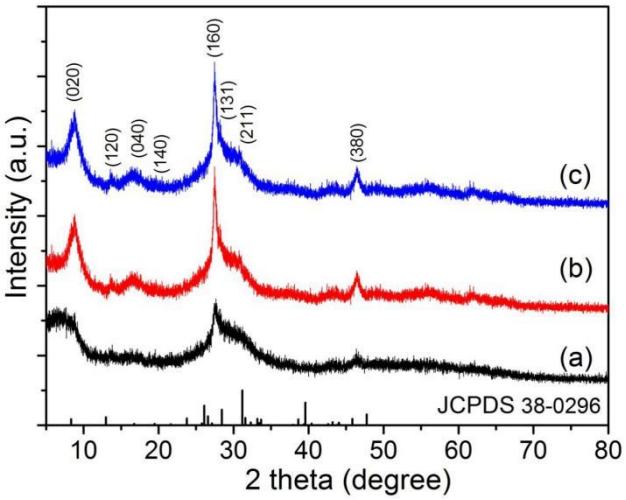

Fig. S1 XRD profiles of as prepared materials at reaction time for (a) 2h, (b) 6 h, and (c) 12 h.

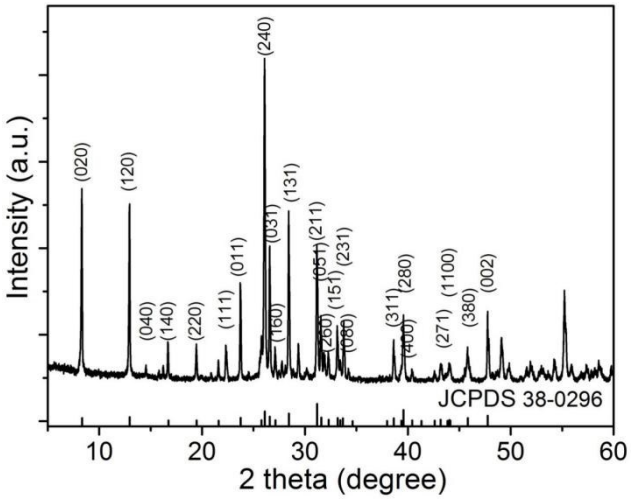

Fig. S2 XRD profile of bulk KNb_3O_8 prepared by SSR method.

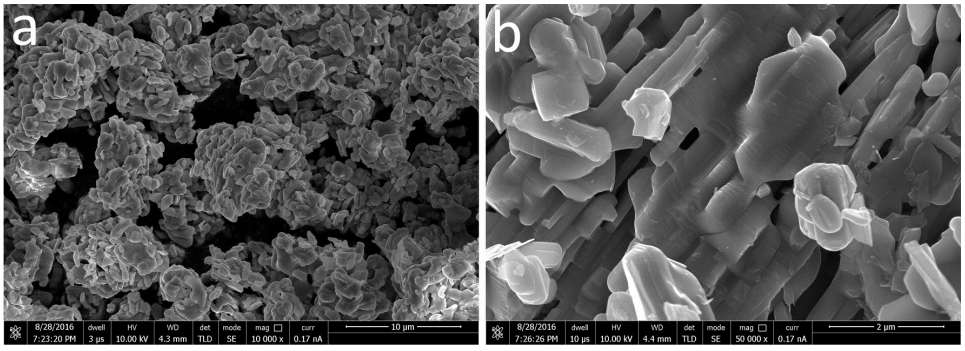

Fig. S3 (a, b) SEM images of bulk KNb_3O_8 prepared by SSR method.

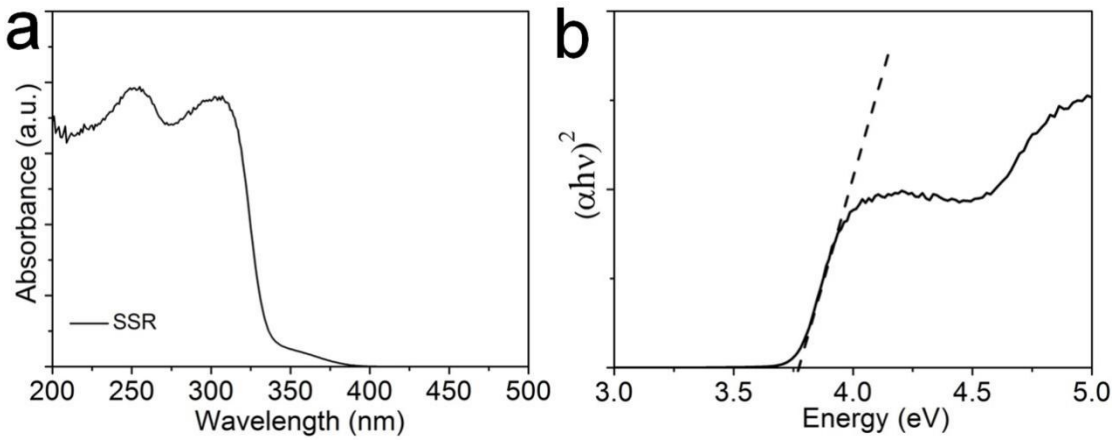

Fig. S4 (a) UV-visible diffuse reflectance spectra for bulk KNb_3O_8 prepared by SSR method; (b) the calculation diagram of its bandgap.

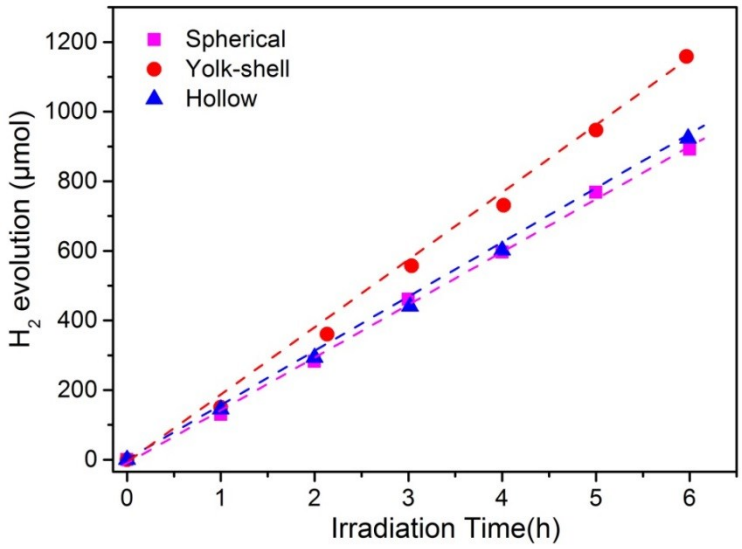

Fig. S5 H_2 evolution respect to time over spherical, yolk-shell, and hollow structures of KNb_3O_8 with loading 1 wt. % Pt.

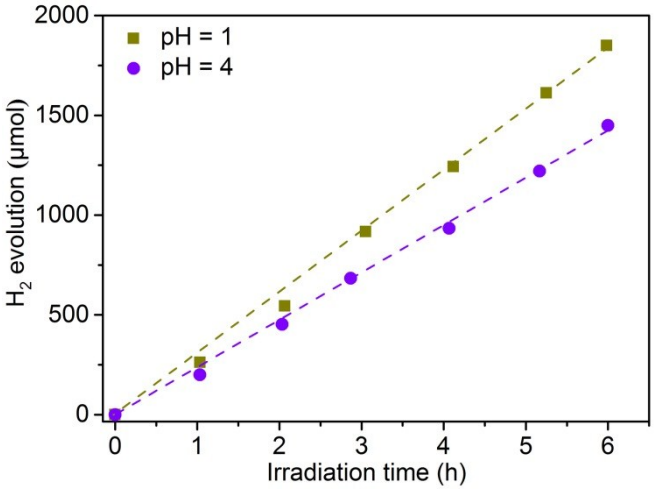

Fig. S6 H_2 evolutions over yolk-shell KNb_3O_8 with loading 1 wt. % Pt at pH 1 and 4.

The H_2 evolution rates are 243 and 317 mmol h^{-1} in the pH of 4 and 1 respectively, which are higher than the evolution rate in pH of 7. Thus, the evolution rates are also increased with decreasing pH. Such results suggest that the higher concentration of H^+ are beneficial to the photocatalytic H_2 evolutions in acid condition. Furthermore, KNb_3O_8 are completely transformed in to HNb_3O_8 because of ions exchange between H^+ and K^+ in acid condition, which also in some extent beneficial the H_2 evolutions.

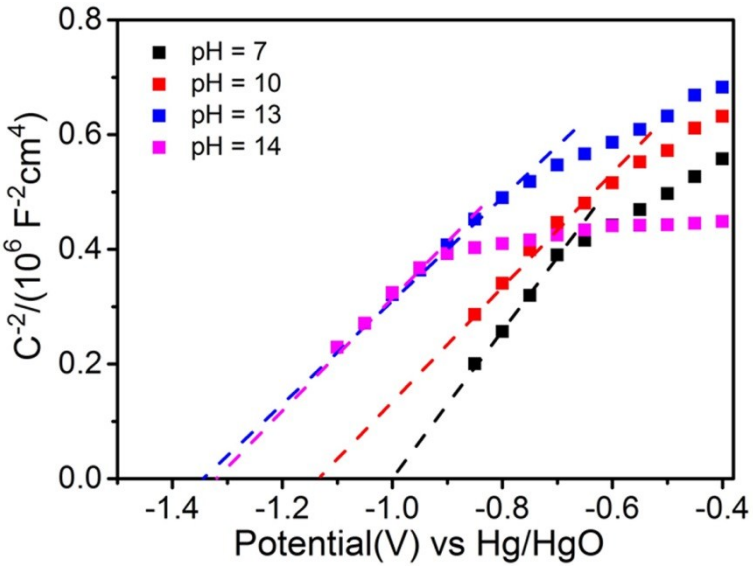

Fig. S7 Mott-Schottky plots of the bulk KNb_3O_8 at various pH values. All samples are loaded with 1 wt. % Pt.