Title: A new approach to enhance photocatalytic nitrogen fixation performance via phosphate-bridge: a case study of SiW_{12}/K-C_3N_4

Authors: Cailin Xiao, Ling Zhang, Kefu Wang, Haipeng Wang, Yuanyi Zhou, Wenzhong Wang

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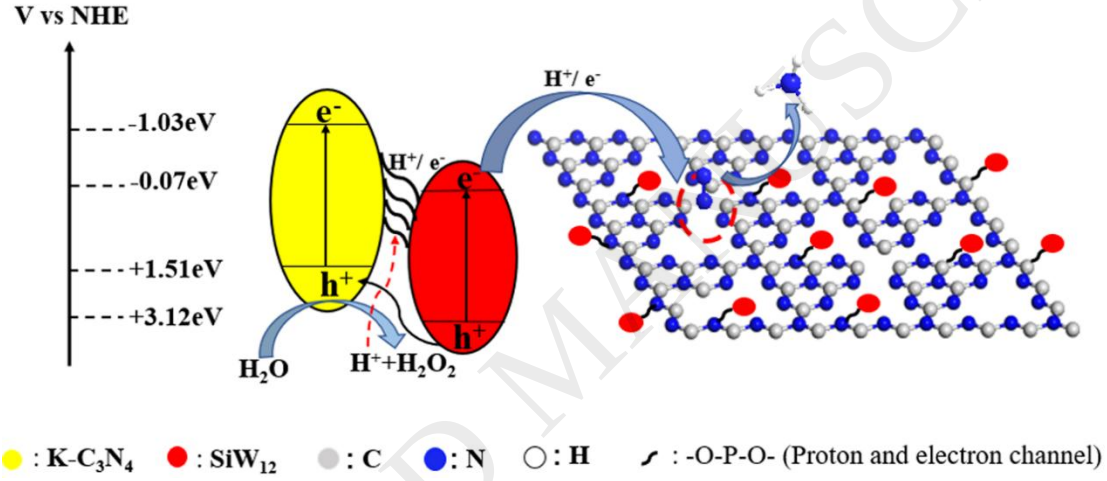
A new approach to enhance photocatalytic nitrogen fixation performance via phosphate-bridge: a case study of SiW_{12}/K-C_3N_4

Cailin Xiao, Ling Zhang, Kefu Wang, Haipeng Wang, Yuanyi Zhou, Wenzhong Wang*

State Key Laboratory of High Performance Ceramics and Super fine Microstructure, Shanghai Institute of Ceramics, Chinese Academy of Sciences, 1295 Dingxi Road, Shanghai 200050, P.R. China

Graphical Abstract



Highlights

- The formation of "phosphate-bridged" bonds between K-C_3N_4 and SiW_{12} enhanced separation efficiency of charge carriers.
- Bridged SiW_{12} enhanced the performance of water oxidation.
- K doping and bridging SiW_{12} improved the adsorption and activation of N_2.
- The nitrogen fixation performance of SiW_{12}/K-C_3N_4 is relatively high.

ABSTRACT: Photocatalytic nitrogen fixation, as a low-cost and promising technology, needs efforts to explore the photocatalyst with high activity and stability. In this study, the polyoxometalate (POM) cluster of [$H_4SiO_{40}W_{12}$] (SiW_{12}) has been successfully covalently combined with the KOH-modified graphitic carbon nitride nanosheets (K-C_3N_4) through the phosphate-bridged strategy. With POM acting as the co-catalyst, SiW_{12}/K-C_3N_4 nanocomposites show excellent photocatalytic nitrogen fixation efficiency (353.2 μM g^{-1} h^{-1})