Design and Energy Application of Photocatalysts Based on Polyoxometalates

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As the energy crisis intensifies, the imperative to utilize energy efficiently has never been more critical. Among the many pressing challenges, the development of high-performance catalysts stands out as a paramount priority. These catalysts are crucial for enhancing the efficiency of various industrial processes and for driving forward the sustainable use of energy resources [1,2].

Polyoxometalates (POMs) have garnered significant attention among researchers in the realms of both homogeneous and heterogeneous catalysis. The Anderson-type POMs, in particular, stand out as versatile catalysts. They boast a range of benefits, including adjustable acidity, robust redox properties, and enhanced electron transfer capabilities, all of which contribute to their exceptional performance across a spectrum of catalytic reactions. This report delves into our latest breakthroughs in the design of efficient photocatalysts leveraging POMs. We explore their application in photocatalytic oxidation desulfurization and the oxidation of 5-hydroxymethylfurfural (HMF), highlighting their synergistic interactions with various carriers such as titanium dioxide (TiO_2), carbon nitride (C_3N_4), and metal sulfides. Our findings reveal that the optimized catalysts exhibit enhanced surface areas and improved stability, which are pivotal for elevating their catalytic efficacy and recyclability in heterogeneous reactions. We have also investigated the factors that influence the optimal photocatalytic oxidation capacity of catalysts, aiming to identify the most favorable conditions for these processes. The report will provide a thorough examination of the conceptualization, synthesis, and detailed characterization of these photocatalytic derivatives. This comprehensive analysis will shed light on their physicochemical properties, offering insights into how they can be further optimized for enhanced performance in various catalytic applications [3-6].

References

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BIO

Dr. Ting SU completed her Ph.D. in 2017 at the Harbin Institute of Technology, under the expert guidance of Professor Yulin Yang. Following her graduation, she joined Yantai University in the same year and was promoted to the rank of Associate Professor in 2021. In 2020, she enriched her academic experience as a visiting scholar at Chimie ParisTech under the expert guidance of Prof. Christophe Len. Dr. SU's research is centered on the innovative design and practical application of Anderson-type polyoxometalates as catalysts. She is also deeply involved in the valorization of biomass-based downstream derivatives through photocatalytic methods, as well as in the fields of photocatalytic oxidation desulfurization and solar cell technology, encompassing dye-sensitized solar cells and perovskite solar cells. Her scholarly contributions have been recognized through over 60 publications, which have garnered more than 1200 citations. Her work has been featured in prestigious journals such as *Applied Catalysis B: Environmental, Chemical Engineering Journal, ChemSusChem, Fuel, Green Chemistry, ACS Applied Materials & Interfaces*, etc. She is a review editor of *Frontiers in Chemistry*.