Unveiling possibilities: Materials, Catalysis, and Solar energy

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Global challenges regarding climate change and energy sustainability demand innovative solutions at the intersection of materials science and renewable energy technologies. This presentation delves into the multi-fold potential of advanced materials—perovskite oxides, mesoporous materials, and MXenes—for addressing critical issues in heterogeneous catalysis, CO_2 capture and conversion, and solar energy utilization.[1-4]

Perovskite oxides, with their tunable chemical composition, can serve as versatile platform for catalytic and redox transformations. Mesoporous materials, characterized by their high surface area, controllable pore structure and their inherent confinement effects, can promote novel pathways and reaction mechanisms that cannot be accessed otherwise. MXenes, a rapidly emerging family of materials, exhibit exceptional physicochemical properties owing to their unique 2D structure and surface functionalities, positioning them as promising materials for a variety of applications.

This presentation explores the specific roles of perovskite oxides, mesoporous materials, MXenes and their post-synthetic structural variants, in advancing catalytic processes and energy technologies. By exploring their unique properties and applications, the performance of these materials is demonstrated for various model reactions, showcasing their role in driving forward a sustainable energy future.

Ultimately, this presentation showcases how functional materials can revolutionize our future energy scenario, emphasizing their pivotal role in advancing sustainable technologies and exploring new frontiers in catalysis, CO_2 mitigation, and solar energy utilization.

References

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