EXPLORING THE CARBON CAPTURE TECHNOLOGY USING PHOTOACTIVATED SOLID-STATE: A COMPREHENSIVE REVIEW

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ABSTRACT

EXPLORING THE CARBON CAPTURE TECHNOLOGY USING PHOTOACTIVATED SOLID-STATE: A COMPREHENSIVE REVIEW

The urgency surrounding global warming has necessitated considerable advancements in carbon capture technologies; however, issues such as environmental conditions of temperature and high band gap of materials continue to limit photoactivated solid-state systems from performing well. The present study aims to undertake a critical review of carbon capture technologies involving photoactivated solid-state materials in order to find nascent solutions for overcoming these hurdles. The study would address three major research questions that touch on what the best materials for adsorbing CO2 would be efficient, the possibility to lessen the band gap of the existing materials to improve the performance of those materials in the industrial carbon capture and which materials demonstrate high mechanical and thermal stability under the operational stresses of carbon capture. This review proposes a framework for selecting and optimizing materials according to efficiency, robustness, and scalability with respect to photoactivated carbon capture by examining current progress, material characteristics, and experimental information. The materials expected outcomes from this work will include an exhaustive evaluation of state-of-the-art materials, identification of promising candidate materials, and finally, a host of practical recommendations on how to enhance and optimize photoactivated carbon capture. The review will help the scientific community by overcoming critical holes in current research, paving ways to better carbon capture solutions, and complementing global efforts toward managing climate change.

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