

Deciphering C-C Coupling in CO₂ Reduction: Advanced Nanomaterial Design Strategies

Sebastian C. Peter

New Chemistry Unit and School of Advanced Materials,
Jawaharlal Nehru Centre for Advanced Scientific Research, India

Email: sebastiancp@incasr.ac.in, sebastiancp@gmail.com

As a notorious greenhouse gas and a potential carbon feedstock, the transformation of carbon dioxide (CO₂) into high value-added fuels or chemicals has been recognized as a promising way to mitigate energy shortages and problems caused by the greenhouse effect. The greenest solution for making fuel from anthropogenic CO₂ is by utilizing abundant solar energy. To make this process economically viable, C₂⁺ products are desired. The challenging multi-electron transfer and kinetically high energy barrier of C-C coupling reaction are the primary reasons for low selectivity of C₂⁺ products. Starting from the fundamental aspects, this talk highlights the discovery of novel catalysts for the efficient photocatalytic CO₂ reduction C₂⁺ products. It will discuss about catalyst design, in-situ techniques for the detection of intermediates and mechanistic insights through experimental and theoretical analysis for the selective photoreduction of CO₂ to C₂⁺ product.

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