Photocatalytically Prepared Metal Nanocluster–Oxide Semiconductor–Carbon Nanocomposite Electrodes for Driving Multielectron Transfer

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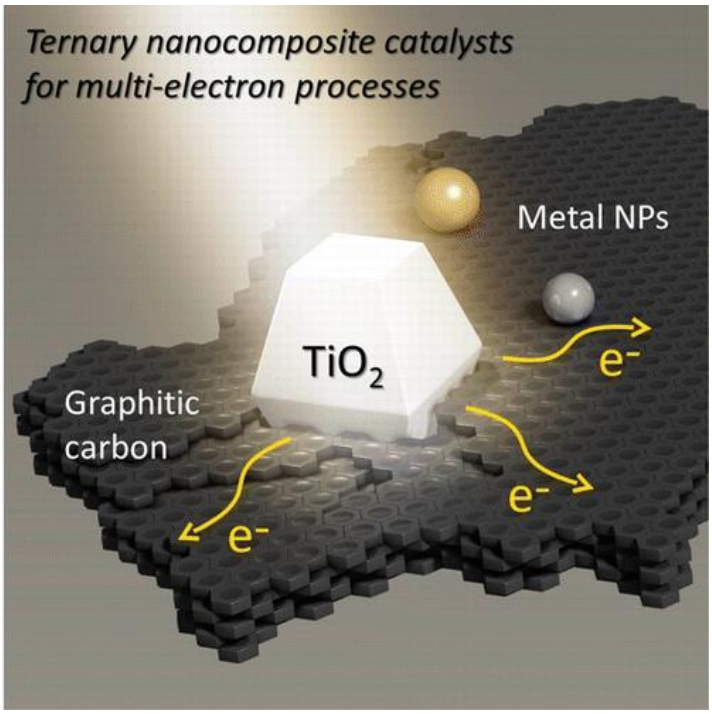
Abstract



Heterogeneous photocatalysis can be used to generate metal-nanocluster-decorated oxide semiconductor–carbon nanocomposite matrixes for driving multielectron processes of practical import. The oxide semiconductor nanoparticles in such assemblies not only facilitate heterogeneous photocatalytic deposition of the metal nanoclusters but have several important functions that are highlighted in this Perspective. This Perspective additionally describes structure–property relationships of various mono-, bi-, and trimetallic electrocatalysts and the roles of the carbon support and the oxide semiconductor in the performance and durability of the overall architectures. Further applicability of such nanocomposites in value-added environmental remediation, such as the conversion of carbon dioxide to alcohol fuels, is discussed.