Smart Photocatalysts for CO2 Conversion into Hydrocarbon Fuels

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Photocatalytic reduction of CO_2 to fuel offers an exciting opportunity for helping to solve current energy and global warming problems. The design and fabrication of highly active photocatalysts remains an unmet challenge. We seek CO_2 photoconversion efficiencies large enough for translation of the technology from laboratory to industry, a key step of which is achieving higher-order hydrocarbon products. In the current work, under AM1.5G illumination, utilitzing a photocatalyst of reduced titania, graphene, and Pt nanoparticles, we demonstrate stable operation, significant rates of product formation, as well as a controllable product transformation from CH_4 to C_2H_6. We find the switch from C_1 to C_2 products is dependent upon upward band bending at the reduced blue-titania/graphene interface.