Atomic and Electronic Structures of Graphitic Carbon Nitride/Graphene Heterostructure

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Graphitic-carbon nitride (g-C_3N_4) has been proposed as a new type of catalysts due to the promising catalytic properties without precious metal. Industrial interests for sustainable and renewable energy have driven many scientists to study the unique feature of g-C_3N_4 as a photo-catalyst.[1,2] Here, we propose that graphene-decorated g-C_3N_4 can be one promising candidate for metal-free hydrogen evolution under visible light with a direct bandgap of 2.51 eV and an indirect bandgap of 1.64 eV. Band-engineered electric properties of this metal-free catalyst were confirmed by scanning tunneling microscopy, spectroscopy (STM/STS) and Kelvin probe force microscopy (KPFM) along with density functional theory (DFT) to explain the electronic structures as the photo-catalyst under visible light in atomic scale. The decoration of g-C_3N_4 with graphene, therefore, can provide a breakthrough for allowing water-splitting reactions under visible light efficiently without precious metal.

REFERENCES:

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