Nitrogen Doped Functionalized Graphene as Sustainable Photocatalyst for Visible Light Induced Overall Water Splitting

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Sustainable, low-cost and abundant energy is the lifeblood for the development of human society. Development of renewable fuels from visible light is one of the key challenge to develop sustainable energy resources. The use of carbon based hybrid nanomaterials as photocatalyst for renewable fuels is an active area of research. Nano-carbons, when synthesized from biomass offer the advantage of cost reduction and sustainability along with tunable band gap either by heteroatom doping or post-synthetic modification. Herein, we investigated that nitrogen doped surface functionalized graphene nanosheets is an efficient catalyst for overall water splitting under the influence of visible light, without use of any co-catalyst reaching on optimum hydrogen generation rate 1.4 mM g^{-1} h^{-1}. Moreover, N-fGNS exhibits excellent visible light photo-response and harvesting. This photocatalytic activity arises from the nitrogen doping and introduction of defects as functional groups.