Research Progress at the "Research Institute of Photocatalysis", Fuzhou University and Current Development of Visible Light-responsible Graphitic Carbon Nitride and Hexagonal Boron Carbon Nitride Photocatalysts

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Energy depletion and environmental pollution on a global scale are the most serious and urgent issues facing mankind in recent times. It is vital to design novel energy production and conversion systems that utilize natural energy and allow sustainable development without environmental destruction or pollution. The splitting of H_2O to produce H_2 as well as the related reactions using visible light-responsive photocatalysts under sunlight irradiation has been intensively investigated to address these issues. In the past half century, research on various photocatalytic systems using metal oxides have been carried out.[1)] However, to achieve higher efficiency in the production of H_2 from H_2O, more innovative breakthroughs in the development of new types of photocatalytic materials have been strongly desired.[1-3)]

To address such issues, graphitic carbon nitride (g-C_3N_4) and hexagonal boron carbon nitride (*h*-BCN) nanomaterials have been investigated in our laboratory as promising visible light-responsive photocatalytic materials.[2-4)] In this presentation, we will introduce research progress at the research institute of photocatalysis and current development of g-C_3N_4[2,4-6)] and *h*-BCN[7,8)] photocatalytic nanomaterials, focusing on their design, construction and optimization as well as their applications to environmentally-benign solar energy conversion systems for the decomposition of H_2O and organic redox reactions. Such visible light-responsive photocatalytic materials can be considered the most important research for the development of safe and clean energy production technologies for the 21st Century and beyond.

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