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Carbon Nitride Growth on ZnO Architectures for Enhanced Photoelectrochemical Water Splitting Application

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Abstract : Graphitic carbon nitride materials (g-CN) have emerged as an attractive photocatalyst and electrocatalyst for photo and electrochemical water splitting reaction, due to their environmental benignity nature and suitable band gap. Many approaches were introduced to enhance the photoactivity and electronic properties of g-CN and resulted in significant changes in the electronic and catalytic properties. Here we demonstrate the synthesis of thin and homogenous g-CN layer on highly ordered ZnO nanowire (NW) substrate by growing a seeding layer of small supramolecular assemblies on the nanowires. The new synthetic approach leads to the formation of thin g-CN layer (~3 nm) without blocking all structure. Two different deposition methods of carbon nitride were investigated and will be presented. The amount of loaded carbon nitride significantly influences the PEC activity of hybrid material and all the ZnO/g-CNx electrodes show great improvement in photoactivity. The chemical structure, morphology and optical properties of the deposited g-CN were fully characterized by various techniques as X-ray powder spectroscopy (XRD), scanning electron microscopy (SEM), focused ion beam scanning electron microscopy (FIB-SEM), high-resolution scanning microscopy (HR-TEM) and X-ray photoelectron spectroscopy (XPS).

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