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Renewable photochemical energy conversion and storage technologies are promising in addressing global energy and environmental challenges. Along with the extensive research still show lots of limitation of semiconductor materials (such like TiO_2, Se, MoS_2 or $NiO/NaTaO_3$) due to their broad band gap in most of the oxide-based photo-catalysts which hinders their light harvesting ability, or a low stability to oxidation and an expensive cost (sulfides and selenides) to exhibiting hydrogen production through water splitting. To consider this concept our approach to develop a novel strategy to synthesize solvent aggregates of supramolecular assembly of graphitic carbon nitride nanomaterials with interconnected two-dimensional (2D) architecture. This research focuses on recent development in novel g-C_3N_4,[1] which is a sustainable, environmentally friendly nanostructured photocatalyst material for efficient water splitting. The overall system is seen as a potential continuous source of hydrogen for various "next step" technologies (fuel cells, hydrogenations, energy storage).

Here we show a facile and scalable new approach for the synthesis of ordered CN materials with an excellent photoactivity, which consists of supramolecular interfacial preorganization of monomers at the interface of two non-miscible solvents. Molecular dynamic simulations supported by experimental results reveal that appropriate mono-mers and solvents choice lead to the formation of a supramolecular assembly solely at the interface of the solvents. As a proof of concept, we show the chemical and physical properties of the g-C_3N_4 materials after thermal condensation in various temperature. The advantages of the new method are demonstrated here through the tuneable morphologies and surface area, the formation of new electronic junctions and high activity as a photocatalyst for hydrogen evolution and pollutants degradation of the g-C_3N_4 materials.[2]

It was synthesized from melamine and cyanuric acid monomers by using different solvent environments. Detailed morphology/structure description of the photocatalysts included TGA, XRD, XPS, SEM, FTIR,

physisorption, Hg porosimetery, UV-vis absorption, PL and Raman spectroscopy.[1,2,3] To evaluate the photoactivity of g-C_3N_4 materials pollutants degradation, namely rhodamine B (RhB) under illumination g-C_3N_4 (550 °C calcination) show the best photoactivity with less time. The absorbance spectra of rhodamine B degradation. As a statement, it is proved that both the chemical (surface area and morphology) and the electronic structure (PL, narrower band gap and more feasible energy band positions) are responsible for the high photocatalytic activity.

References

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