Crystal Engineering of Triazine Molecules toward Macroscopic Assemblies of 2D Graphitic Carbon Nitride

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Graphitic carbon nitride (g-CN) has attracted great interests in photocatalysis because of its intrinsic stability and electronic structures superior to the conventional transition metal oxides, sulfides and nitrides counterparts. It is in general generated by polycondensation of nitrogen-rich organic molecules at high temperatures. The solid state reaction around 550°C, close to its decomposition temperature (~650°C), often limits further advancement of the polymeric semiconductor via generation of nanostructure. In addition, the random aggregation of nanostructures in a powder form decreases surface accessibility to substrate molecules in catalytic reactions. For practical applications, it is important to translate novel properties of nanostructures into macroscopic materials. Here, we report very simple method based on crystal engineering to develop macroscopic ordered structures of 2D g-CN ranging from μm to mm. Their synthesis, electronic and catalytic properties will be discussed in detail.