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REVIEW

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Emerging tri-s-triazine-based graphitic carbon nitride: A potential signal-transducing nanostructured material for sensor applications

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Abstract

Today, tris-s-triazine based graphitic carbon nitride (g-C_3N_4) is a new research hot topic. It has a unique electronic band structure, high physicochemical stability, large surface area, and is "earth-abundant." These and other properties have made it a highly researched material especially for visible light photocatalysis and photodegradation applications and as the starting material from which to develop novel electrochemical sensing platforms. In this review, the state-of-the-art technologies utilizing tris-s-triazine graphitic carbon nitride as a tailorable signal-transducing nanostructured material for sensing applications is presented in detail. Initially, the electronic structure of g-C_3N_4, morphologies, doping, heterojunctions, its combination with other carbon materials, and defect formation, is described, which is followed by a discussion on its role in electrochemiluminescence, photoelectrochemical, fluorescence sensors and gas sensors as a signal transducer with appropriate examples. This review concludes with a discussion summarizing state-of-the-art and both future perspectives and challenges at the cutting edge of this research.

KEYWORDS
graphitic carbon nitride, nanocomposites, sensors, structures