ABSTRACT

This research work explores the role of graphitic carbon nitride in glucose sensing. Graphitic carbon nitride (g-C_3N_4) is coming out as a promising material for a wide range of applications as sensors due to its distinguishing electronic, optical, and catalytic features. This research work provides a comprehensive and detailed overview of the doping of graphitic carbon nitride and explores the various morphological forms of g-C_3N_4, which may include quantum dots, nanosheets, nanorods, nanoribbons, etc. Additionally, a variety of synthesis techniques have been employed to achieve these morphological forms, and their associated doping methodologies are critically evaluated and discussed. The thesis starts by discussing the fundamental properties and structure of graphitic carbon nitride, focusing on its potential for doping to enhance its versatility and extend its applications. The effects of dopant on the electronic cloud, bandgap engineering, charge separation, and photocatalytic performance is giving GCN a special place in the upcoming era to be used as sensors and for the degradation of organic compounds. It focuses on the techniques involved in the conversion of bulk GCN into nanosheets. Chemical exfoliation, thermal exfoliation, liquid exfoliation, and chemical blowing are a few methods employed here for the conversion of bulk into nanosheets. It also discusses doping, comparison of doped and undoped GCN, the enhanced features due to each dopant, and its applications. At last, its role as a biosensor of glucose is studied.