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Influence of pyrolysis temperature on the mesoporous graphitic carbon nitride and its effect on physicochemical properties for energy application.

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Graphic carbon nitride (GCN) was synthesized through a direct pyrolysis of urea at different calcination temperatures (450,500, 550, and 600 ℃). The effect of the pyrolysis temperatures on the structural, compositional, morphological, and surface area properties were studied. The GCN powders were characterized through X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), Field emission scanning electron microscopy (SEM), and Brunauer-Emmett-Teller (BET). The XRD analysis showed that the samples consist of two characteristic reflections (100) and (002) belonging to graphitic carbon nitride. A close examination at the (002) peaks uncovers that as the calcination temperature rises the peak slightly shifts towards a higher 2 theta diffraction angle. This leads to the deduction that increasing the pyrolysis temperature can improve the interlayer stacking order of g-C3N4. The crystallite sizes were determined by the Debye-Scherer method and found to increase with pyrolysis temperature. The FE-SEM images revealed that there is variation in the surface morphology of the samples depending on the calcination temperature. The FTIR confirmed the presence of functional groups and chemical bonds. Finally, the BET showed that the samples were mesoporous with pore sizes ranging from 2- 20 nm. The specific surface area was 32.31, 37.14, 56,64, and 51.59 m2/g for 450, 500, 550, and 600 ℃ respectively.

Apply to be considered for a student ; award (Yes / No)?

yes

Level for award;(Hons, MSc, PhD, N/A)?

PhD

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