EFFECT OF ANNEALING IN HYDROGEN ATMOSPHERE ON MORPHOLOGY, STRUCTURE AND PHOTOCATALYTIC ACTIVITY OF GRAPHITIC CARBON NITRIDE

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In this study, graphitic carbon nitride (gCN) was modified by annealing in the hydrogen atmosphere. The aforementioned process has the merit of generating nitrogen vacancies on the gCN surface. The optimal photocatalytic activity of modified gCN samples was demonstrated by controlling the temperature (400, 450, 500 and 550 °C) and duration (1, 2, 3 and 4 h) of treatment in H_2 atmosphere. The changes in the morphology, chemical structure, optical and electrochemical properties were carefully investigated by several microscopic and spectroscopic techniques (TEM, AFM, XRD, XPS, FTIR, BET, DRS, PL, EIS, CA and UV-vis). The as-modified materials exhibited enhanced photocatalytic degradation of Rhodamine B (RhB) under visible light irradiation. For example, among the temperature-dependent samples, 500-2 (500 °C, 2 h) has the highest efficiency, 1.27 times larger than pristine gCN. In the case of time-dependent samples, 500-4 (500 °C, 4 h) catalyze the complete decomposition of RhB after 1.5 h of illumination (1.76 times higher compared to reference gCN). The photocatalytic improvement is attributed to the value of the energy band gap, increased surface area for abundant reaction sites, and formed pores for shortening the diffusion lengths of the photogenerated charge carriers to reach the surface [1].

[1] X. Kang, Y. Kang, X. Hong, Z. Sun, C. Zhen, C. Hu, G. Liu, H. Cheng, Progress in Natural Science: Materials International, **28**, 2, 183 (2018).