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Deposition of carbon nitride thin films by using radical source

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Carbon nitride (CN_x) thin films have been extensively studied by the desire to synthesize the β-C_3N_4phase predicted theoretically. Various attempts have been made to synthesize this material by both physical and chemical deposition, such as sputtering, pulsed-laser deposition, ion beam assisted deposition, chemical vapor deposition, and electrolysis. However, most synthesized films were predominantly amorphous with few predicted crystalline CN films.

CN_x films fabricated by different deposition techniques to synthesize of β-C_3N_4 involve two problems; nitrogen deficiency and sp^2 hybridized bonding. Nitrogen contents in most of the thin films are lower than stoichiometric composition 57% and all carbon of the predicted β-C_3N_4phase has to be sp^3 hybridized, however, incorporation of N in sp^3-rich C strongly promotes a transformation of the C to sp^2 . We applied a new method by using radical source to increase the nitrogen content in the carbon nitride thin films. X-ray photoelectron spectroscopy (XPS) and Fourier transform infrared spectroscopy (FT-IR) were used to analyze the chemical properties of the films.