

## The effect of nitrogen flow rates on the bond structures and mechanical property of amorphous carbon nitride films

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Amorphous carbon nitride (a-CN) films were deposited onto Si(100) substrates at room temperature by plasma enhanced chemical vapor deposition (PECVD) with different nitrogen flow rate. The gas mixtures of CH<sub>4</sub> and N<sub>2</sub> were used for carbon and nitrogen sources, respectively. FT-IR spectra showed various bond structures such as C-N (~ 1100 cm<sup>-1</sup>), C=N (~ 1600 cm<sup>-1</sup>), and C≡N (~ 2200 cm<sup>-1</sup>) in as-deposited a-CN films. Especially, an increase in N<sub>2</sub> flow rate led to a decrease in the intensity of the triple bond (C≡N). The Raman-scattering spectra showed D band (D is attributed for disorder) at 1380 cm<sup>-1</sup> and G band (G is referred for graphite) at 1580 cm<sup>-1</sup>. Raman spectra indicated that the bond structures change to graphite like structure with increasing N<sub>2</sub> flow rate. This graphitization of the films structures leads to a decrease in the film hardness from ~ 9.8 to ~ 8.8 GPa. And, the decrease of triple bond intensity also effects on the film hardness.