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Relation between CN radical behaviors and growth of amorphous CNx films in an RF magnetron sputtering system

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A study on the relation between CN radical behaviors and growth mechanism of the CNx films was conducted in an RF magnetron sputtering system. The effect of varying the N2 pressure and axial substrate position on the CN radical distribution was investigated. CN radical behaviors was measured using laser induced fluorescence (LIF) and the chemical bonds in the films were observed by Fourier transform infrared (FTIR). The results of these experiments indicate that the reactive CN radicals are more easily generated in the N2 plasma as the working pressure increases. However, the amount of radicals in the gas phase barely affects on the CNx film growth. We believe the carbon nitride growth mechanism may be controlled not in the gas phase but at the growth surface interaction. The simulations of ion energy and collisions in the sheath would support our argument.