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The Effect of Plasma Power on the Composition and Microhardness of α -SiC:H Films Grown by PECVD

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Amorphous hydrogenated silicon carbide (α -SiC:H) films were deposited at the temperature of 400 °C using plasma enhanced chemical vapor deposition. The α -SiC:H films were characterized by x-ray photoelectron spectroscopy (XPS) and nanoindentation method. By increasing the plasma power from 20 W to 160 W, the oxygen content of the α -SiC:H films were observed to decrease from 12.1 % to 4.4 %. On the other hand, the plasma power did not affect the ratio of carbon to silicon in our experiment where the 1,3-disilabutane was used as the precursor. Microhardness of the films was observed to increase as the plasma power increased, while the elastic modulus was observed to have a maximum value at the plasma power of 80 W. Microhardness of the film is thought to be strongly affected by the content of adventitious oxygen in the film and it is concluded that the hardness of the film can be improved by increasing the plasma power.