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Effect of Argon flow and DC bias on optical emission spectroscopy of Argon/Hydrogen plasmas. BHAVESH RAMKORUN, KALLOL CHAKRABARTY, SHANE CATLEDGE, University of Alabama at Birmingham — Microwave plasma chemical vapor deposition (MPCVD) processes often make use of hydrogen and argon in the feedgas mixture. Ions in the plasma bombard the growing materials surface and can affect sp2/sp3 molecular bonding configurations (such as synthesized in hexagonal/cubic boron nitride coatings). In this study, we investigate the effect of DC bias on a silicon substrate, using optical emission of hydrogen plasmas containing a range of argon flow rates. Microwave power and chamber pressure were held fixed at 0.6kW and 10Torr, respectively. Optical emission spectroscopy (OES) was used to analyze intensity from select emission lines of hydrogen (434 nm, 486 nm, and 656 nm) as well as from argon (696 nm, 706nm, and 763nm). Our results indicate that the intensity of argon increases linearly as flow rate of argon increases. The intensity of argon is also independent on the bias voltage of the substrate between –100 V and –260 V. The intensity of hydrogen remains constant when flow rate of argon changes from 0 sccm to 200 sccm. However, when the flow rate of argon changes from 300 sccm to 500 sccm, the intensity of hydrogen increases with bias voltage from – 100V to -260 V. These results may be used to correlate plasma emission characteristics based on substrate bias conditions with coating structure/properties in order to better predict and control MPCVD-grown materials.

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