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Negative Ion Densities and EEDFs in BCl_3/N_2 and BCl_3/SF_6 CCP Plasmas[1] BOGDAN PATHAK, JOHN ALEXANDER, KAREN NORDHEDEN, Plasma Research Laboratory, University of Kansas — Previous work has shown that the addition of N_2 or SF_6 to BCl_3 plasmas results in an enhancement of the etch rate of GaAs. Langmuir probe measurements were performed to further investigate this enhancement. The energy distribution functions revealed an increase in negative ion density as N_2 or SF_6 were added to BCl_3. The negative ion density reaches a maximum near 55% BCl_3 for N_2 mixtures and 40% BCl_3 for SF_6 mixtures. This increase is most likely due to dissociative attachment. The shape of the electron energy distribution function in BCl_3/N_2 mixtures remains relatively unchanged and there is a decrease in the average electron energy with increasing N_2 percentage. Energy transfer from nitrogen metastables appears to be responsible for the increased dissociation in BCl_3/N_2 mixtures. This contrasts with BCl_3/SF_6 mixtures in which the electron density rapidly decreases and the average electron energy sharply increases at low SF_6 percentages, indicating that electron attachment heating is responsible for the enhanced dissociation.

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