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Characterization of radical production mechanism in CHF_3 and CF_4 inductively coupled plasmas YAPING WANG, SHUXIA ZHAO, Dalian University of Technology, PSEG TEAM — Inductively coupled fluorocarbon (fc) plasmas are widely used in Si/SiO_2 etching industry as they provide active radicals which are reactive to the Si or SiO_2 materials. It is well known that CHF_3 plasma has relatively low density ratio of F vs. CF_x radicals and hence high etching selectivity, as compared with the CF_4, due to the fact that one F is replaced by H in CHF_3 molecules and H can abstract F from fluorocarbon radicals to form HF. However, for now, much elaborate details are still missed in the literature. Therefore in this work, a fluid model is used to characterize the radical production components in these two different fc plasmas. The fluid model includes continuity and energy equations for electrons, continuity and momentum equations for ions and continuity equations for radicals. An electromagnetic model is used to calculate the electric field which is generate by coupling coil current and Poisson equation is used to calculate the static field within the plasma. The model predicts the electron density, ion density and radical density of CHF_3 plasma. For now the simulations of CF_4 plasma are still under construction. We expect to compare the different radical production mechanisms in the $CHF_3$and CF_4 plasma sources in new future.

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