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. $CF_2$ 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.

Yaping Wang
Dalian University of Technology

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