## Abstract Submitted for the GEC09 Meeting of The American Physical Society

Negative ion temperature in a low-pressure oxygen ICP discharge DEREK MONAHAN, MILES TURNER, Dublin City University — The primary reaction mechanism leading to the formation of negative ions under typical oxygen discharge conditions is dissociative attachment of molecular  $O_2$ . Though unable to absorb significant energy from the applied rf field these ions are formed "hot", acquiring kinetic energy from the local ambipolar field and via the process of chemical dissociation. However, their negative charge and large mass (relative to the electrons) means they are confined to the discharge bulk and "cooled" efficiently in elastic collisions with the background gas. Thus, one commonly assumes that the effective negative ion temperature,  $T_-$ , is in approximate equilibrium with the background gas temperature,  $T_g$ . In our ICP-like oxygen plasma simulations, we observe a notable increase in  $T_-$  as the  $O_2(a^1\Delta_g)$  metastable density is increased. We attribute this increase in effective temperature to an increase in the destruction rate of the negative ions and conclude that, in a sufficiently destructive plasma environment,  $T_-$  may exceed  $T_g$  considerably.

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