

## **Atmospheric Plasma Deposition and Overview of Illinois Fusion Technology Research**

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At the Center for Plasma-Material Interactions (CPMI) at the University of Illinois at Urbana-Champaign, work is done on three areas all revolving around the plasma-material interface. The primary work described here will be the use of an atmospheric-pressure microwave torch to do processing steps normally only done in vacuum. These include cleaning, etching, and deposition. In particular deposition is done by evaporating, decomposing, or sputtering the material feed stock by injecting it through the center electrode. In this manner coatings are produced which normally only result from vacuum processes. In addition CPMI works heavily in fusion energy technology. CPMI has a hybrid tokamak/stellarator named HIDRA which has a major radius of 72cm and a minor radius of 19 cm. This 70 ton device requires 2MW to run, and can obtain a steady state magnetically confined plasma of  $T_e \sim 10\text{eV}$  and  $n_e \sim 10^{18}\text{m}^{-3}$  at fields up to 1 Tesla. The fusion effort centers around the use of molten flowing lithium as a plasma facing material and its stability, heat removal capacity and effects on the plasma itself are all being studied. An overview of the fusion efforts will be presented.