Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Numerical modeling of a large area microwave plasma chemical vapor deposition system.[1] JAMES SENIG, XIAOWEN WANG, Univ of Alabama - Tuscaloosa — A particular challenge for low temperature plasma (LTP) research is the diversity of parameter space and conditions. For plasma systems where the densities are not low, the kinetic theory is time-consuming and becomes unrealistic. In this regime, the particle-in-Cell (PIC) method is appropriate where the evolution of a particle system at every time step consists of an Eulerian stage and a Lagrangian stage. The PIC method can deal with complex geometries and large distortions in the field. The PIC solver, Starfish, is a two-dimensional plasma and gas simulation code operating on structured 2D/axisymmetric Cartesian or body fitted stretched meshes. The purpose of this study is to use the Starfish Plasma Simulation Code for modeling a large area (30 cm x 30 cm) microwave plasma chemical vapor deposition system. With the exact geometries and experimental results being provided, numerical simulations of the applications are ongoing. The study is beneficial to many current hypersonic challenges due to the limitations of materials degradation under extreme conditions (i.e. thermal, electrical, magnetic, acoustic, shear, or pressure fields in hypersonic conditions).

[1]This material is based upon work supported by the NSF EPSCoR RII-Track-1 Cooperative Agreement OIA-1655280. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

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Date submitted: 28 Jun 2020 Electronic form version 1.4