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3D-simulation of an ICP torch and outside vapor deposition of SiO_2 MARGARITA BAEVA, DIRK UHRLANDT, INP Greifswald, Felix-Hausdorff-Str. 2, 17489 Greifswald, Germany — A three dimensional model of an inductively coupled plasma torch and a moving target has been developed to describe the process of SiO_2-deposition during the manufacturing of preforms for optical fibers. The model is based on the customized CFD-ACE+ commercial package. The steady state continuity, momentum and enthalpy equations are solved assuming local thermal equilibrium and laminar flow, and optically thin plasma. The energy coupling to the plasma accomplished through the electromagnetic field of an induction coil and the radiation losses from the plasma are accounted for in the discretized fluid enthalpy equation as source terms. The surface reaction governing the deposition process is included to serve as a boundary condition for the species mass fractions in the fluid. The equation of heat transfer in the substrate has been completed to account for the real motion (both translation and rotation) of the substrate. The model developed supplies information about the flow, temperature, electromagnetic field, and the deposition rate on the target surface and torch walls for real geometries. It can be applied to study the influence of various operating parameters on the deposition rate as well as optimization of equipment and productivity.

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