Abstract Submitted
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Microwave Argon Plasma Torch EDGAR FELIZARDO, IPFN - IST, Portugal, MARIANA PENCHEVA, EVGENIA BENOVA, St. Kliment Ohridski University of Sofia, FRANSISCO DIAS, ELENA TATAROVA, IPFN - IST, Portugal, IPFN - IST, PORTUGAL TEAM, ST. KLIMENT OHRIDSKI UNIVERSITY OF SOFIA TEAM — A theoretical and experimental investigation of a microwave (2.45 GHz) Argon plasma torch driven by a surface wave is presented. The theoretical model couples in a self-consistent way the wave electrodynamics and the electron and heavy particle kinetics. The set of coupled equations includes: Maxwell's equations, the electron Boltzmann equation, including electron-electron collisions, and the particle balance equations for electrons, excited atoms (4s, 4p, 3d, 5s, 5p, 4d, 6s), and atomic (Ar^+) and molecular ions (Ar_2^+). The input parameters of the model are: gas pressure (760 Torr), plasma radius ($R = 0.75$ cm), dielectric permittivity ($\varepsilon_d = 4.0$) and tube thickness (d = 0.15 cm) as well as the measured axial profile of the gas temperature (3500 K - 1500 K). The latter was determined from measurements of the rotational temperature of the OH molecular band in the range 306 - 315 nm. Phase and amplitude sensitive recording provides the data for the axial wavenumber and wave attenuation coefficient. The wavenumber decreases along the generated plasma torch. The electron density (N_e) axial profile as determined from measurements of H_β Stark broadening is in agreement with the theoretical one.

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