Abstract Submitted
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Modelling of microwave-driven micro-plasmas in HCPCF[1] L.L. ALVES, IPFN/IST-UTL, Portugal, O. LEROY, C. BOISSE-LAPORTE, P. LEPRINCE, LPGP-UPS/CNRS, France, B. DEBORD, F. GEROME, R. JAMIER, F. BENABID, GPPMM/XLIM, CNRS-UNILIM, France — New UV sources based on microwave-driven micro-plasmas filling a Hollow-Core Photonic Crystal Fibre (HCPCF) [1], exhibit an unprecedented compactness, flexibility, low-cost and high conversion efficiency. The micro-plasma (>10^{14} cm^{-3} electron density, estimated by electromagnetic calculations) is produced by a surface-wave discharge (2.45 GHz frequency) in argon, at 1000-1400 K gas temperatures (measured by OES diagnostics). Our first approach to simulate this system replaces the cladding structure of the fibre (air-holes region) by a capillary cylindrical quartz tube. Simulations use a one-dimensional (radial) stationary model that solves the fluid transport equations for electrons and positive ions, the electron mean energy transport equations, Poisson's and Maxwell's equations for the fields and the gas energy balance equation, coupled to the electron Boltzmann equation for the calculation of the relevant electron parameters [2,3]. We analyze the modification of the plasma with changes in the work conditions, presenting simulations for various HCPCF core radii (50–500 μm) and electron densities (1–5x10^{14} cm^{-3}), at 1mbar pressure. [1] B. Debord et al, ECOC conference Mo.2.LeCervin.5. (2011) [2] L.L. Alves et al, Phys. Rev. E 79, 016403 (2009) [3] J. Gregório et al, Plasma Sources Sci. Technol. 21, 015013 (2012)

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L.L. Alves
IPFN/IST-UTL

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