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Coupling modes in a dipolar microwave plasma source ANA LACOSTE, PIERRE BAELE, REMY MAURAU, STEPHANE BECHU, ALEXANDRE BES, LPSC, Université Grenoble Alpes, CNRS/IN2P3, 53 rue des Martyrs, 38026 Grenoble Cedex, France — The multi-dipolar microwave plasma is a suitable technology for the scaling-up of high density plasma processing in the very low pressure range. Effectively, a large area or volume of plasma can be achieved by a mere distribution, over 2 or 3 dimensions, of a number of elementary plasma sources. To enhance the microwave coupling efficiency and optimize the spatial repartition of the elementary plasma sources, it could be helpful to localize the production regions and coupling modes that govern the energy transfer from the wave to the electrons. The main objective of this work is to identify the possible coupling modes as a function of operating parameters. Accordingly, the plasma parameters (electron temperature, density) were correlated together with the electromagnetic radiation, as well as with different coupling modes observed as a function of microwave power. High plasma densities, up to 10 times the critical density (for one source), can be achieved through an efficient transfer of the electrostatic wave energy to the electrons.

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