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3D simulation of integrated multi-coil ICP source with azimuthal modes JOZEF BRCKA, Tokyo Electron U.S. Holdings, Inc. — Integrated multi-coil (IMC) planar ICP source with azimuthal motion is presented. Scaling ICP sources to larger substrate size is always complicated due to many technical issues and is challenged by the plasma chemistry. The source described in this work has capability of azimuthally moving plasma and has potential for large area and high density plasma applications. Hence, this system does not have an ideal axial symmetry, the 3D model approach has to be used to assess its transient performance. Moreover, reactor walls are imposing stronger boundary conditions on distribution of the radicals in "off-axis reactive plasma." Intrinsic asymmetry of source and plasma were investigated by 3D fluid model developed under Plasma Module framework and supported by COMSOL Multiphysics solvers. Operation modes have potential to control plasma distribution, reaction chemistry and increase/modulate radicals' production. Simulation confirmed assumption that plasma distribution may essentially change in different gas. Under specific conditions integrated multi-coil ICP source is producing pulsed plasma. Temporal, spatial and population plasma characteristics were investigated in an inert carrier gas (Ar) and reactive plasma consisting of several gases (Ar, H2, CO and CH4).

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