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Two dimensional fluid simulation in capacitively coupled silane discharges[1] YUAN-HONG SONG, XIANG-MEI LIU, YAN WANG, YOU-NIAN WANG, School of Physics and Optoelectronic Technology, Dalian University of Technology, Dalian 116024, China — A two-dimensional (2D) self-consistent fluid model is developed to describe the formation, subsequent growth, transport and charging mechanisms of nanoparticles in a capacitively coupled silane plasma. In this discharge process, large anions are produced by a series of chemical reactions of anions with silane molecules, while the lower limit of the initial nanoparticles are taken as large anions to directly link the coagulation module with the nucleation module. The influences of source parameters on the electron density, electron temperature, nanoparticle uniformity, and deposition rate, are carefully studied. Moreover, the behavior of silicon plasma mixed with SiH_4, N_2 and O_2 in a pulse modulated capacitively coupled plasma has been also investigated. Results showed a strong dependence of the electron density and electron temperature on the duty cycle and the modulated frequency.

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