

Abstract Submitted
for the GEC07 Meeting of
The American Physical Society

Nanoscale particles in reactive RF plasmas: size-dependent dynamics and influence on plasma I.V. SCHWEIGERT, A.L. ALEXANDROV, D.A. ARISKIN, Institute of Theoretical and Applied Mechanics, 630090 Novosibirsk, Russia, F.M. PEETERS, University of Antwerpen, B-2020 Antwerpen, Belgium, I.I. STEFANOVIC, E. KOVACEVIC, J. BERND, J. WINTER, Ruhr-University Bochum, 44780 Bochum, Germany — A CCRF discharge with growing nanoparticles in Ar and C₂H₂ mixture was studied experimentally and with using kinetic PIC-MCC simulations. The dust particle diameter ranged from 0 to 200 nm. It was found that at an initial stage of the growth the nanoparticles are situated near the sheath-plasma boundaries where the ionization rate by the electron impact has peaks. The presence of nanoparticles strongly impacts the plasma, and at some critical nanoparticle size the discharge transits from the active sheath regime to the volume dominated mode. Growing further, the dust particles first gradually spread to discharge center and only weakly disturb plasma parameters and then they form the void. The dust particle distribution was measured using Laser Light Scattering technique. In the experiment the nanoparticles are produced and grown by plasma polymerization and we measure their dynamics from early stage until the formation of the void. Calculated and measured properties of discharge, operation modes and nanoparticle distribution agree quantitatively.

I.V. Schweigert
Institute of Theoretical and Applied Mechanics, 630090 Novosibirsk, Russia

Date submitted: 14 Jun 2007

Electronic form version 1.4