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Control of ionic species composition in complex plasmas dominated by charge exchange collisions KOSTYA OSTRIKOV, School of Physics, The University of Sydney, Australia — A generic approach towards tailoring of ion species composition in reactive plasmas used for nanofabrication of various functional nanofilms and nano-assemblies, based on a simplified model of a parallel-plate rf discharge, is proposed. The model includes a reactive plasma containing two neutral and two ionic species interacting via charge exchange collisions in the presence of a microdispersed solid component ("dust"). It is shown that the number densities of the desired ionic species can be efficiently controlled by adjusting the dilution of the working gas in a buffer gas, rates of electron impact ionization, losses of plasma species on the discharge walls and surfaces of fine particles, charge excahnge rates, and efficiency of three-body recombination processes in the plasma bulk. The results are relevant to plasma-assisted fabrication of ordered patterns of carbon nanotip and other carbon-based nanostructures.

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