Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Low-temperature control of plasma-assisted nanofiber heating HAMID MEHDIPOUR, Physics Department, Faculty of Science, Sahand University of Technology, 51335-1996, Tabriz, Iran, KOSTYA OSTRIKOV, Plasma Nanoscience, School of Physics, The University of Sydney, Sydney, New South Wales 2006, Australia — Three model, sheath, growth, and heat models are coupled to investigate the direct dependencies of the carbon nanofiber growth and heating on the plasma parameters in a low-temperature plasma. Using the models, the effects of variation in the plasma sheath parameters and substrate potential on the plasma heating effects in catalyzed growth of carbon nanofiber have been investigated. Numerical results have shown that variations in some parameters such as the electron temperature, electron number density, and substrate potential, which change the sheath width, mainly affect the growth rate and carbon nanofiber heating at low catalyst temperatures and the other parameters such as gas pressure and the ratio of the hydrocarbon/etching gas density to total gas density, change the carbon nanofiber growth at all temperatures and substantially increases the temperature of catalyst particle, attached to carbon nanofiber end, respect to the temperature at substrate interface with substrate-holding platform. These results are also consistent with the available experimental results of the selectively control of plasma-assisted nanostructure heating and the catalyzed growth of some high-aspect-ratio structures.

Hamid Mehdipour
Physics Department, Faculty of Science,
Sahand University of Technology, 51335-1996, Tabriz, Iran

Date submitted: 13 Jul 2010 Electronic form version 1.4