Abstract Submitted
for the GEC10 Meeting of
The American Physical Society

Numerical study of the plasma chemistry for an inductively coupled plasma used for the synthesis of carbon nanotubes MING MAO, ANNEMIE BOGAERTS, PLASMANT Research Group, Department of Chemistry, University of Antwerp — Carbon nanotubes (CNTs) are gaining increasing interest, due to their unique physical, chemical and electronic properties, giving rise to a variety of (potential) applications. Plasma enhanced chemical vapour deposition (PECVD) has become a very promising technology for the direct synthesis of vertically aligned CNTs. In this presentation, a hybrid model, called the hybrid plasma equipment model (HPEM), is used to describe the plasma chemistry in an inductively coupled plasma, operating in a gas mixture of CH_4 with either H_2 or NH_3, as typically used for carbon nanotube (CNT) growth. Two-dimensional profiles of power density, electron temperature and density, gas temperature, and densities of some plasma species are plotted and analyzed. Besides, the fluxes of the various plasma species towards the substrate (where the CNTs can be grown), as well as the decomposition rates of the feedstock gases (CH_4, NH_3 and H_2), are calculated as a function of the CH_4 fraction in both gas mixtures. Finally, the influence of O_2 addition to CH_4/H_2 mixture on the plasma chemistry will be discussed and analyzed.

Ming Mao
PLASMANT Research Group,
Department of Chemistry, University of Antwerp

Date submitted: 01 Jun 2010 Electronic form version 1.4