# Tuesday, November 15, 2011 9:30AM - 12:30PM -

# Session DT1 DPP/GEC Joint Session: Low Temperature Plasmas I Ballroom H

#### 9:30AM DT1.00001

### Damage-free Neutral Beam Etching, Deposition and Surface Modification Processes for Novel Nano-scale Devices, SELJI SAMUKAWA, Tohoku University

— For the past 30 years, plasma process technologyhas led in the efforts to shrink the pattern size of ultralarge-scale integrated (ULSI) devices. However, inherent problems in the plasma processes, such ascharge build-up and UV photon radiation, limit the process performance for nanoscale devices. To overcome these problems and fabricate nanoscale devices in practice, we have proposed damage-free neutral-beam process. In this presentation, I describe the issues of plasma processes and the demanded atomic layer process for future nanoscale devices. I also introduce our developed damage-free etching, structure-designable deposition of super low-kSiOC film and low-temperature oxidation (thin SiO2, GeO2) processes using neutral beams and discuss the actual applications of neutral beam processing for future nanoscale devices (such as, Fin-MOSFET, and Quantum Dot Solar Cell). Neutral beams can perform atomically damage-free etching, deposition and surface modification. Then, the neutral beam process can precisely control the atomic layer chemical reaction and defect generation. This technique is a promising candidate for the nano-fabrication technology in future nanoscale devices.

#### 10:00AM DT1.00002

### <u>Electric double layers and their applications to astrophysical objects and electric</u> propulsion , CHRISTINE CHARLES, The Australian National University

— Electric double layers, abrupt potential drops within a plasma, exist in the plasma environment of the Earth and the stars, can cause phenomena as diverse as aurorae, or electromagnetic radiation from rotating neutron stars and may also play an important role in supplying and accelerating plasma in coronal funnels at the surface of the Sun. In the laboratory, both current-driven and current-free double layers have been generated and studied in a variety of experimental devices. The class of current-free double layers which form in low pressure magnetically expanding plasmas (e.g. from Helicon sources) for a variety of gases and geometries exhibit interesting electron and ions dynamics properties. The latter are also observed in particle-in-cell simulations. Application of expanding plasmas to the field of electric propulsion is receiving increasing interest: in addition to thruster performance assessment and optimisation, direct measurements of thrust combined with spatial mapping of the expanding plasma provides

ome information on momentum flux imparted from an expanding plasma and on plasma detachment from a magnetic field.

#### <u>10:30AM DT1.00003</u>

## Effect of non-Maxwellian Electron Energy Distributions on Langmuir Probe Measurements and Heat Transmission in Tokamak Divertor Sheaths1, MICHAEL JAWORSKI, Princeton Plasma Physics Laboratory

— Tokamak scrape-off-layers have long been analyzed and modeled with a single-fluid approach. Recent research indicates that kinetic effects in the SOL may be significant enough to challenge this approach [1].