Abstract Submitted
for the GEC10 Meeting of
The American Physical Society

Radiofrequency plasma deposition from Ar/HMDSO/O_2 glow discharge: Correlation between chemical structure and thin film mechanical and thermal behavior ARUP JYOTI CHOUDHURY, JOYANTI CHUTIA, Institute of Advanced Study in Science and Technology, DINKAR S. PATIL, Bhabha Atomic Research Center — Hexamethyldisiloxane (HMDSO) films are deposited on bell metal by radiofrequency (RF) plasma polymerization process, using Ar/HMDSO/O_2 glow discharge. The chemical structure of the HMDSO films is studied by Raman spectroscopy and X-ray photoelectron spectroscopy (XPS). It is observed that HMDSO films with least defective chemical structure and highest inorganic character exhibits excellent mechanical and thermal behavior. From scratch and nanoindentation test, it is observed that maximum critical load (14.5 mN) is applied on the HMDSO film prepared at RF power of 100 W, which also shows highest hardness (3.9 GPa) and elastic modulus (48.1 GPa). The thermogravimetric analyses (TGA) reveal that degradation temperature of the HMDSO films increases while their percentage of weight loss decreases at higher RF powers. Attempts are made to correlate the chemical structure with the mechanical and thermal behavior of the deposited HMDSO films.

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Date submitted: 28 May 2010 Electronic form version 1.4