

Progress on Fabrication of Glow Discharge Polymer Shells as ICF targets at CAEP

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The glow discharge polymer (GDP) shells are used as the ablaters for inertial confinement fusion (ICF) targets. In order to avoid the preheat of DT by high energetic X rays, the shells have to be doped with a small quantity of high Z material. The doped GDP shells are fabricated exclusively by plasma polymerization technology, which is well known today and largely used. But the shells for laser fusion targets have many stringent characteristics. Although this process of coating shells has been done for years, there is still need for the research to prepare GDP shells meeting all the specifications. An investigation of the chemical structure, surface morphology, and doped concentration of GDP shells is described. The experimental results have shown that 1 at% to 5 at% silicon concentration and 1 at% to 3 at% germanium was attained, respectively. Besides, the gas-phase analysis and the characterization of the GDP plasma were obtained by the Quadrupole Mass Spectrometer (QMS) and Langmuir probe during the deposition process. The results have shown that the rf power significantly affected the carbon bonds, microstructures and surface roughness of the GDP shells. By adjusting the rf powers, the structures were modified, and in some case, the surface roughness decreased dramatically.

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