

# DEPOSITION AND CHARACTERISTICS OF CHLORINE DOPED GLOW DISCHARGE POLYMER FILMS\*

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## ABSTRACT

Shells coated with glow-discharge polymers doped with chlorine (Cl-GDP) are desired for diagnostic purposes for the OMEGA experiment. We have deposited Cl-GDP by using a number of different chlorinated hydrocarbons which had enough volatility to be used in our plasma polymerization system. Chlorine concentrations of our films were measured by combustion analysis and x-ray micro fluorescence (XRF). The chlorine concentration can be varied between  $\leq 1$  to  $\approx 35$  atomic percent. With chlorinated hydrocarbon gas as the sole precursor, the films were amber in color and stress free. Addition of small amounts of H<sub>2</sub> and/or trans-2-butene led to reduction of the chlorine content and increase in stress and darkness of the films. Surfaces of the chlorine-doped films were usually covered with domes and, in many cases, with spherical beads which may have formed in the gas phase. By reconfiguring the helical resonator power input tap and grounding points we were able to lower the active plasma region in the coating tube to obtain films which have better surface finish. Rutherford Back Scattering measurements indicate that the chlorine-doped films exhibit depletion of chlorine near the surface, which is consistent with XRF measurements showing reduced chlorine content in thin ( $\leq 2$   $\mu\text{m}$ ) films. However, cross-sectional EDAX measurements of thick films revealed no bulk chlorine concentration inhomogeneity.

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