Be Coatings on Spherical Surface for NIF Target Development*

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Beryllium is one of the preferred ablators for achieving ignition in inertial confinement fusion (ICF). Thin and thick coatings of Be on CH shells have been deposited using a sputter coater established at UCSD's PISCES facility and examined using a variety of characterization techniques. Due to the spherical nature of these substrates, higher surface diffusion barrier and shadowing effects are expected to play significant roles in film growth. Be coatings on flat surfaces and spherical surfaces have been deposited and compared to understand the material growth behaviors on different surfaces and as a function of processing parameters. On flat surfaces, Be film developed polycrystalline morphology with columnar growth. On spherical surface, Be film also showed columnar growth at lower power, which could then be transformed into a twisted grain structure at higher power. Possible higher adatom mobility due to higher ion flux at higher power is believed to contribute to the growth morphology changes. Cycling of parameters has been used to investigate possible grain growth interruption during growth and improving morphology. Initial results also suggest that copper doping during deposition does not change the columnar growth morphology. As ion beam assisted growth may improve the surface finish and micros-structure of deposited films, we have also studied the effect of process parameters on the flux and energy of the ions reaching the substrates using an offline mass spectrometer system.

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