Abstract Submitted
for the GEC05 Meeting of
The American Physical Society

Oxygen Plasma Ion Implantation in MgF2 Anti-Reflection Coatings M. TUSZEWSKI, K. SCARBOROUGH, Los Alamos National Laboratory — Low-energy (< 10 kV) oxygen (O+) plasma ion implantation is performed in the (100-nm-thick) MgF2 anti-reflection coatings of various solar panel coverglasses. O+ implantation could cause MgF2 darkening, and associated degradation of solar array power observed in Global Positioning Satellites (GPS). We irradiate various GPS coverglass samples with O+ doses up to 1015 cm-2, corresponding to a 10 year-exposure in simulated average oxygen environment at GPS orbit (20,000 km altitude). The O+ implants are performed with a low-pressure (0.5 – 3 mTorr) inductive plasma source and a commercial high-voltage pulser. Negative high-voltage pulses (5 – 20 microsecond widths, 1 – 10 kV amplitudes, 0.1 - - 2 kHz repetition rates) are applied to samples mounted on a downstream, water-cooled, electrode. The optical transmission (200 – 800 nm) of the samples is measured before and after each implant. Preliminary results suggest that the O+ implants indeed cause some optical transmission loss in the MgF2 coatings. The oxygen plasma density profiles, the electron temperatures, and the plasma potentials are measured with Langmuir probes. The oxygen species content are measured with optical and mass spectrometry. These measurements are required to estimate as accurately as possible the incident O+ doses.

Michel Tuszewski
Los Alamos National Laboratory

Date submitted: 16 Jun 2005 Electronic form version 1.4