# Post Flight Evaluation of the LeRC Samples Flown on POSA-II

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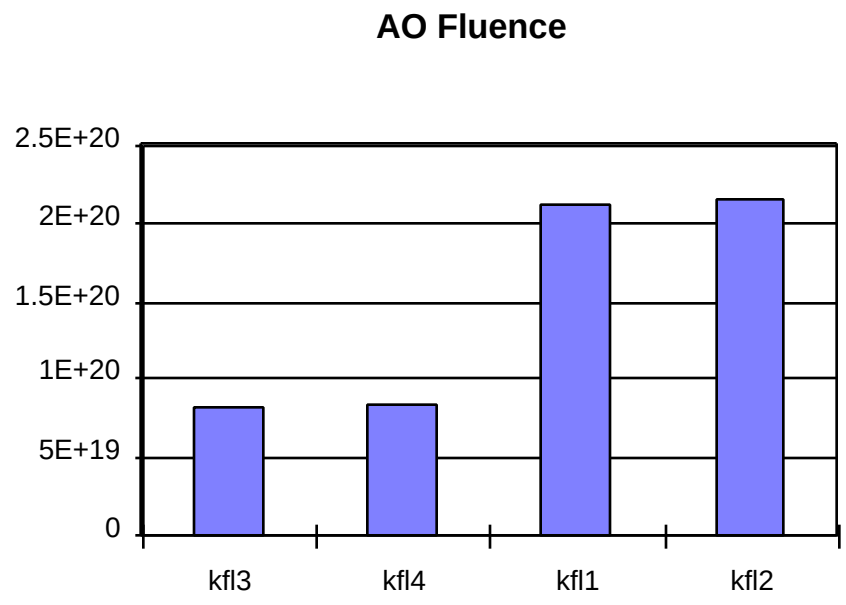
## Samples and Objectives

- Polyimide Kapton H, 0.005” thick, for mass loss measuements, to calculate atomic oxygen fluence.
- $SiO_x$ coated Kapton H Solar Array Blanket, 0.001” thick, provided by Sheldahl, for atomic oxygen undercutting measurements.
- Front surface aluminized sapphire, to optically measure degradation as a result of contamination.
- Aluminum on spin-coated polyimide (protected by $SiO_x$) to measure specular reflectance degradation as a result of atomic oxygen attack at defect sites.
- Silver on spin-coated polyimide (protected by $SiO_x$) to measure specular reflectance degradation as a result of atomic oxygen attack at defect sites.
- CV1144 silicone, to look for embrittlement.
- Z-93-P thermal control paint to assess emittance and absorptance changes for comparison with LeRC ground qualification test results.

# Atomic Oxygen Fluence

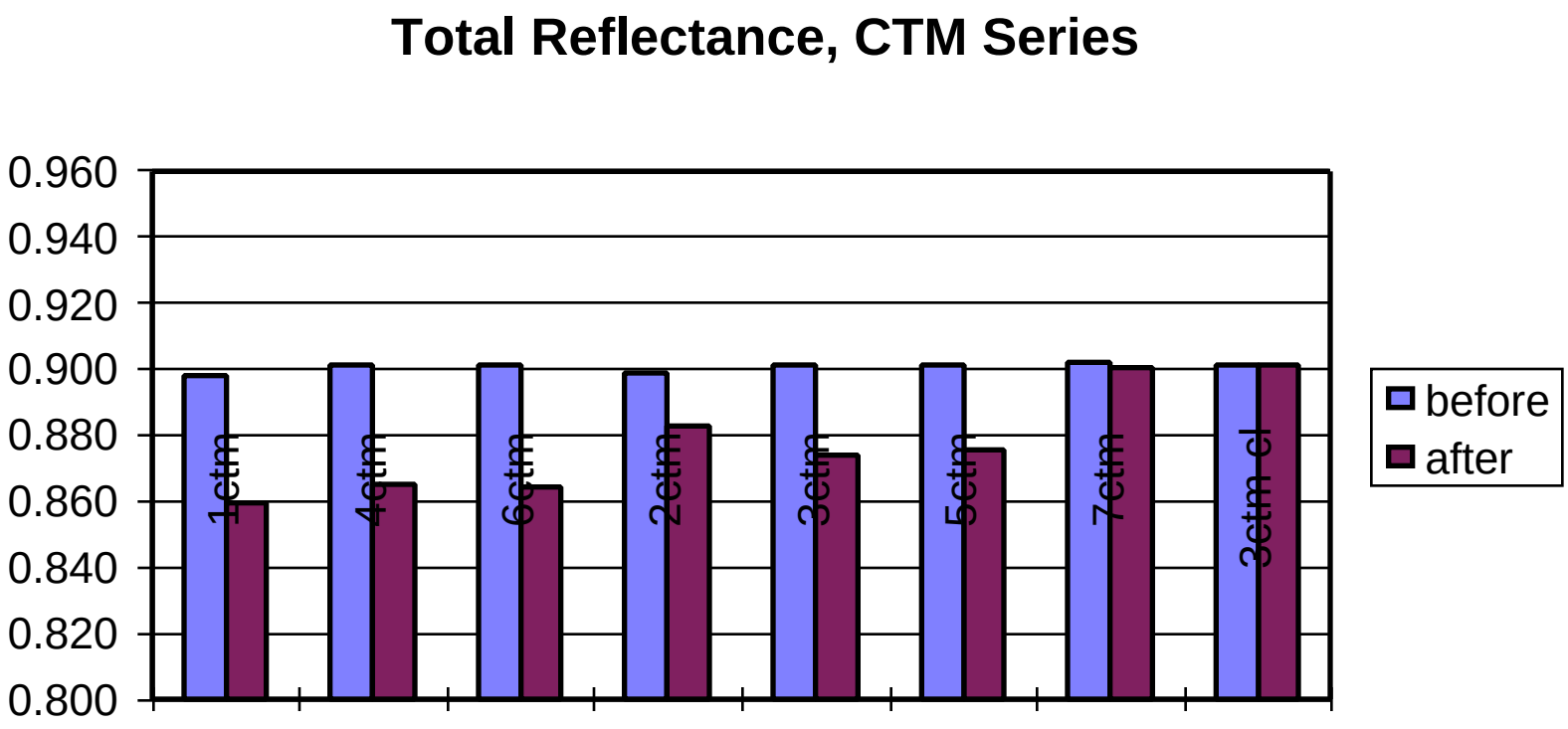
- Dehydrated Kapton mass was used to calculate atomic oxygen fluence:
  - $8.2 \times 10^{19}$ atoms/cm$^2$ for Mir facing side.
  - $2.1 \times 10^{20}$ atoms/cm$^2$ for Shuttle facing side.
- Essentially no change was observed in dehydrated mass of Sheldahl samples:
  - A/O fluence too small for undercutting studies.
  - Mass of organic contaminant found to be negligibly small.



## Sapphire Contamination Monitor, the CTM Series

- Ellipsometry at UNL identified an inorganic contaminant as $SiO_2$, at thicknesses of:
  - 240 Angstroms for the Mir facing side.
  - 40 Angstroms for the Shuttle facing side.
- Total reflectance decreased, consistent with the presence of contaminants on the surface.
- Solar absorptance increased.
- Diffuse reflectance increased, probably due to the organic contaminant.

Sapphire Contamination Monitor, the CTM Series



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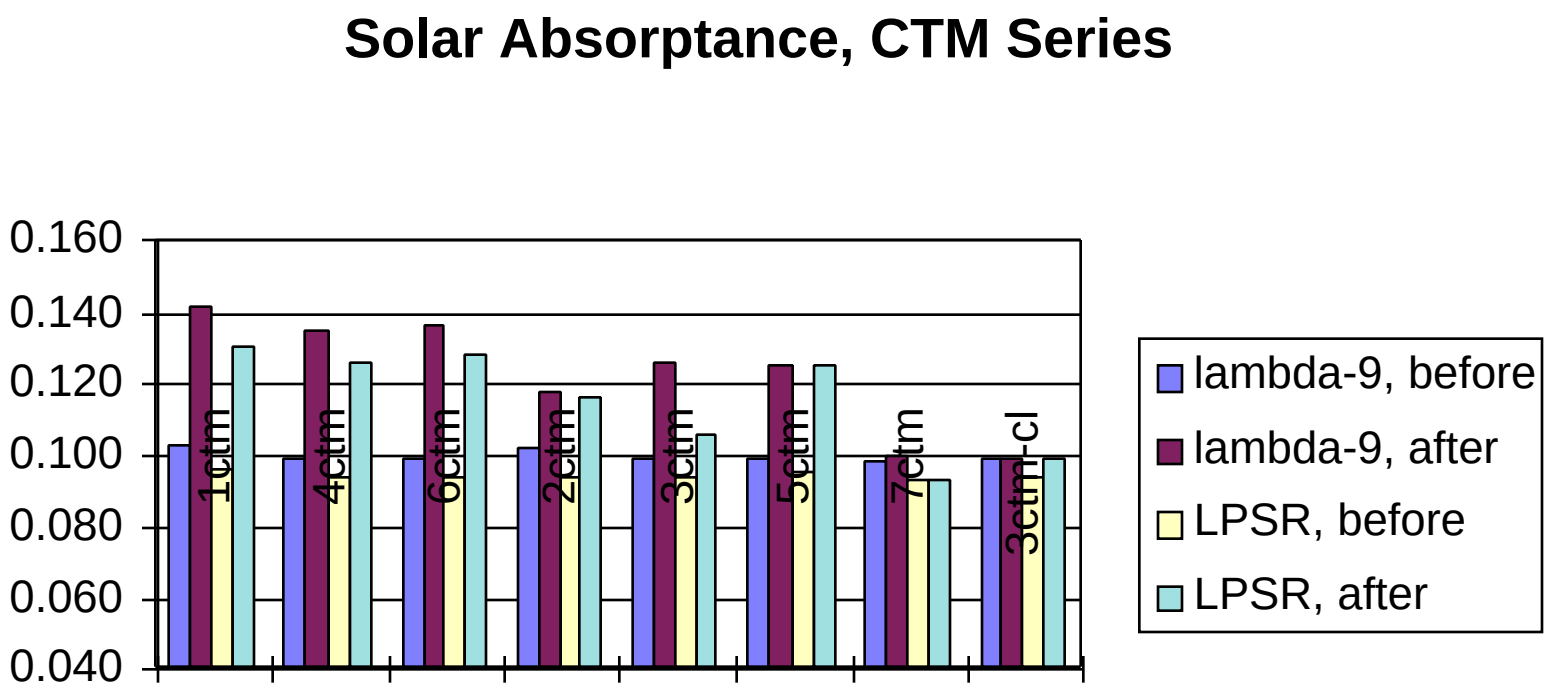
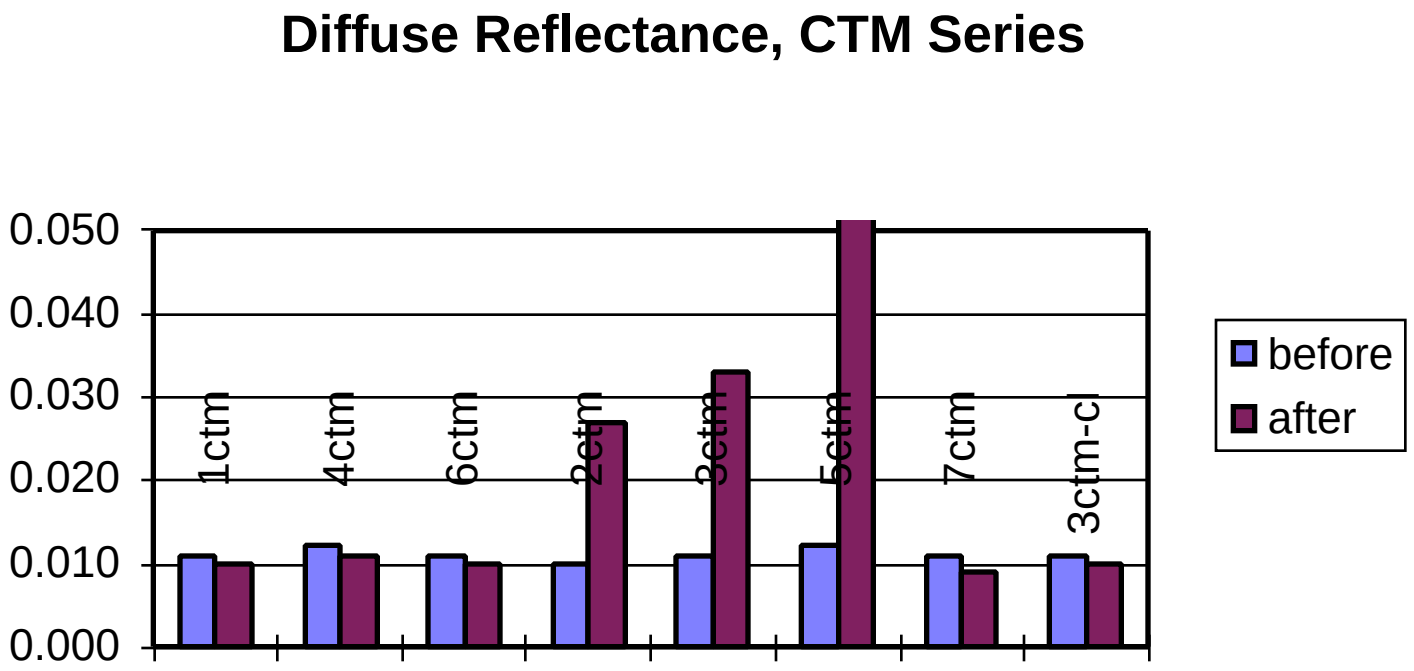
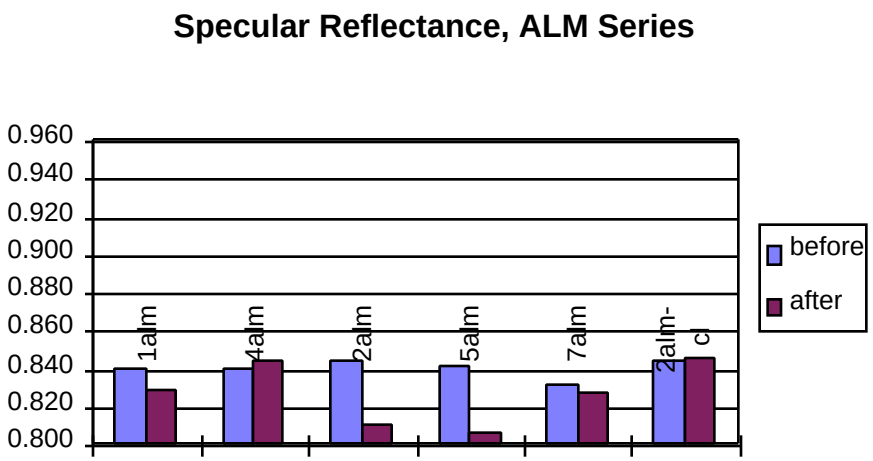


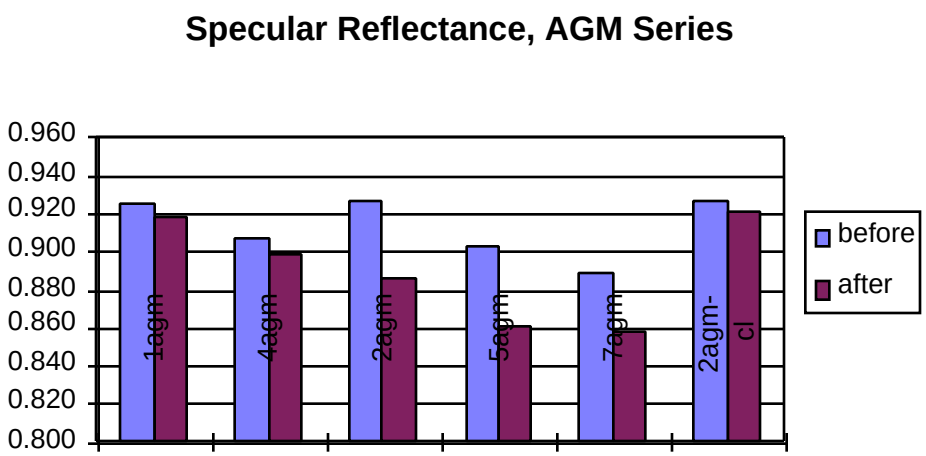
Sapphire Contamination Monitor, the CTM Series



# Aluminum and Silver Mirrors, the ALM and AGM Series

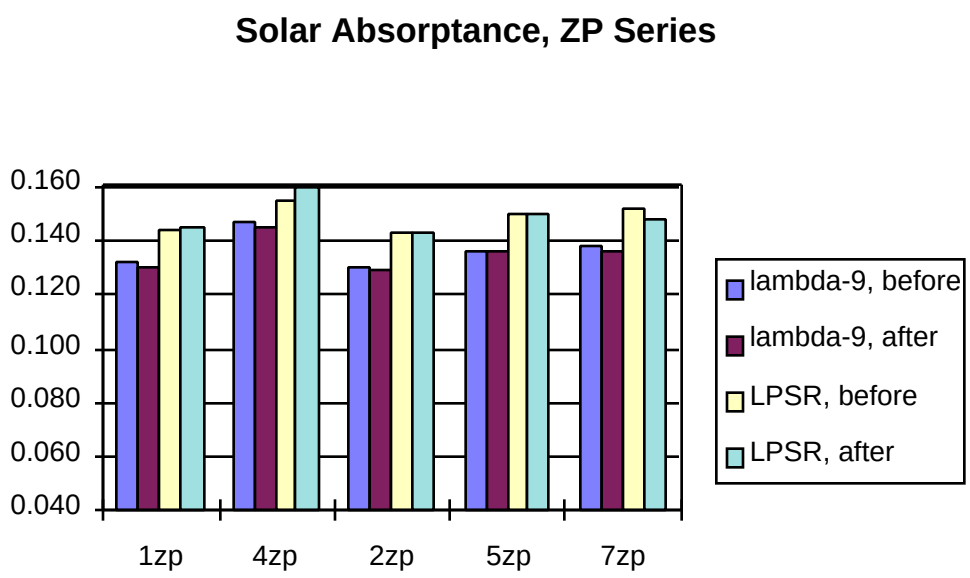
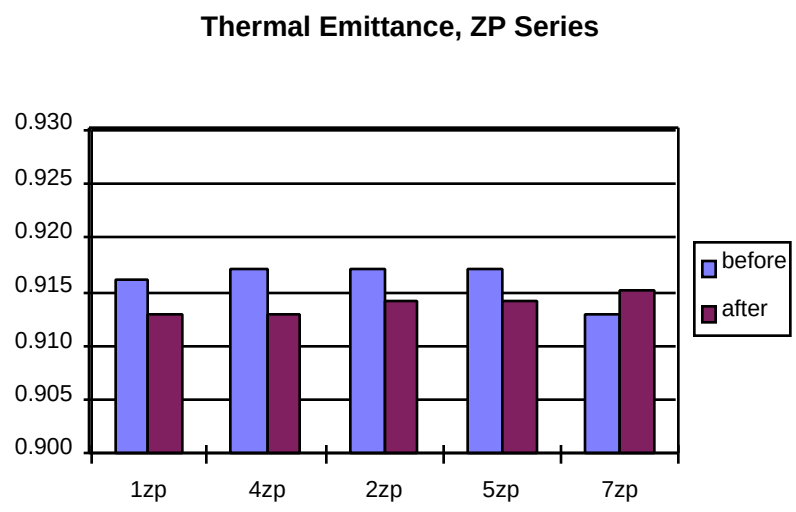
- No significant change in optical properties.
- Note change in AGM ground control...



## CV1144 Silicone, the SIM Series

- SEM photos of the Kapton used to protect the CV1144 show a variety of textures.
- Samples were submitted for Pico Indenter analysis, to look for silicone embrittlement, hardening, etc (in progress).

# Z-93-P, the ZP Series

- No change in the solar absorptance, consistent with ground test results.
- Little change in infrared emittance, consistent with ground test results.