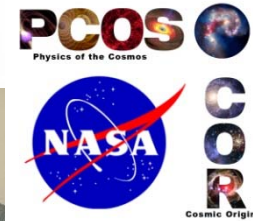


Ultraviolet Coatings, Materials and Processes for Advanced Telescope Optics



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Objectives and Key Challenges:

- “Development of UV coatings with high reflectivity (>90-95%), high uniformity (<1-0.1%), and wide bandpasses (~100 nm to 300-1000 nm)” is a major technical challenge as much as it is a key requirement for cosmic origins program and for exoplanet exploration program. This project aims to address this key challenge and develop feasible technical solutions.

Significance of Work:

- Materials and process technology are the main challenges. Improvements in existing technology base and significant innovations in coating technology such as Atomic Layer Deposition will be developed.

Approach:

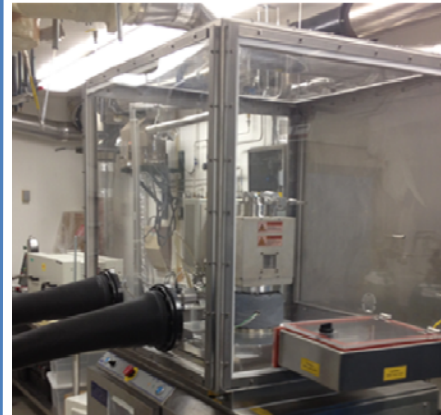
- A set of experimental data developed with MgF_2 , AlF_3 and LiF protected Al mirrors in the wavelength range 100 to 1000 nm for a comprehensive base of measured data to enable full scale developments with chosen materials and processes.
- Enhanced coating processes including Atomic Layer Deposition (ALD) will be studied.

Key Collaborators:

- Stuart Shaklan (JPL), Nasrat Raouf (JPL), Shouleh Nikzad (JPL), John Hennessy (JPL)
- Manuel Quijada (GSFC) FY15.
- Paul Scowen (ASU), James Green (Univ of Colo) FY14.

Current Funded Period of Performance:

- Jan 2013 – Dec 2015



ALD chamber at JPL



1.2m coating chamber at Zecoat Corp

Recent Accomplishments:

- ✓ A coating chamber has been upgraded with sources, temperature controllers and other monitors to produce coatings of various materials. Measurement tools are also established now at JPL and at GSFC.
- ✓ Initial samples of protected Al with LiF and AlF_3 have been produced and measured with encouraging results for further improvements
- ✓ ALD coating process tools and process for MgF_2 and AlF_3 have been developed and are being optimized
- ✓ Produced & tested mirror coupons representing a meter-class mirror (2015)

Next Milestones:

- Reach ~ 90% reflectivity in the 100 to 200nm band (2015)

Application:

- The technology to enable future astrophysics and exoplanet missions that aim to capture key spectral features from far UV to near infra red.
- ATLAST, LUVOIR, HDST, EXEP Missions

TRLin = 3 TRLcurrent est. by PI = 3 TRLtarget = 5