

## V202a Environmental Test of Silver-based Coatings for TMT Optics

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Thirty Meter Telescope (TMT) will have silver based coating for its primary (M1), secondary (M2), and tertiary mirrors(M3) to utilize good reflectivity from optical to IR wavelengths. The initial coating will be the protected silver which has been used at Gemini Telescopes mirrors. In order to make use of good transmission that extends to 300 nm ultraviolet (UV) wavelengths at the telescope site (Maunakea, Hawaii), it is imperative to have sufficient reflectivity from UV to IR. TIO has worked with Lick Observatory and other organizations to develop UV-enhanced silver based coating. Before applying such new coating recipe on the telescope optics, further tests are necessary such as the long term performance and the stripping process to enable recoating.

We acquired UV-enhanced coating candidate samples. From summer 2022, they are exposed at Keck Telescope on Maunakea along with Gemini recipe samples and silver samples from Subaru Telescope for comparison, and they will undergo regular CO<sub>2</sub> cleaning. In this report, the initial measurement of the reflectivity from UV to near IR will be discussed. The UV-enhanced samples do have good reflectance in UV with caveat, that is, there are broad-band features. It is important to see if these features change significantly over time.

Samples will be retrieved after 1, 2, and 5 years, respectively, for reflectivity evaluation. TIO plans to recoat each M1 segment or M2 or M3 in 2-year cycle. If the degradation is small enough, the cycle can extend and will reduce the operation load.