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Prevention of oxidation in aluminum for space-based telescopes using fluorides, metals, and polymers[1] STEPHANIE THOMAS, Brigham Young University — In the 2020 decadal review, NASA will likely discuss plans for the Large UV-Optical-IR (LUVOIR) space-based telescope. One of the purposes for the telescope is to aid in the detection and characterization of planets in other solar systems. In an effort to extend the range of reflectance into the far-UV, we propose using pure aluminum as a mirror. Aluminum has up to ˜95% reflectance up to ˜15 eV and is almost completely transparent at higher energies. Barrier layers such as fluorides, polymers, and volatile metals prevent aluminum oxidation, which occurs almost instantly and causes the mirror to lose reflectance at ˜6.2 eV. MgF_2 has extended reflectance to ˜12.4 eV. Polymers and volatile metals are removed in vacuum by hydrogen sputtering and re-evaporation. Hydrogen sputtering successfully removed polymers without interacting with the aluminum surface. Preliminary results of using Cd and Zn for re-evaporation show poor adhesion and that the method requires some revision.

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