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DEVELOPMENT OF A POLYSILAZANE PROTECTION COATINGS AGAINST ATOMIC OXYGEN

Abstract

A polysilazane protection coating against atomic oxygen has been developed by Beijing Institute of Spacecraft Environment Engineering and State Key Lab for Corrosion and Protection of Metals. Polysiloxane is often used to be protective coating against atomic oxygen. After exposing atomic oxygen, a SiO₂ film can be formed on polysiloxane coating surface. The SiO₂ film is able to protect polysiloxane coating from atomic oxygen erosion. But during SiO₂ film is formed, the surface density of polysiloxane coating will be increased. It may cause reduction in bulk of polysiloxane coating and micro-cracks formation in SiO₂ film. At the micro-cracks of SiO₂ film, “under-cutting” will be occurred under SiO₂ film during atomic oxygen impaction. This paper introduces a polysilazane protection coating developed by Beijing Institute of Spacecraft Environment Engineering and State Key Lab for Corrosion and Protection of Metals. After atomic oxygen exposing, Si-N-Si bonds of the polysilazane coating will be broken and Si-O bonds can be formed. A SiO₂ film can be produced on its surface. In order to increase thermal stability of the coating, polysilazane solution is processed with cross-linking catalyst. The coating is carried out atomic oxygen-resistance test, ultraviolet-resistance test and thermal shock-resistance test and is analyzed for its thermal stability, surface morphology and surface component. The results show: SiO₂ film formed on polysilazane coating is transparent, uniform, flexible and tough. Its micro-cracks is much less than polysiloxane coating's and its atomic oxygen erosion rate is 10-26cm³/AO. The erosion rate is lower 100 times than polymer substrate. Its atomic oxygen-resistance is better than polysiloxane coating.