Advanced Parylene Technology for Space Environment

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As technologies continue to evolve, requirements for high levels of protection and reliability of assemblies, components (including sensors, optical windows and displays) and electronics used in aerospace and military assemblies, particularly in harsh operating conditions, are also increasing. In addition, light-weighting continues to be a key topic for the aerospace, avionics and defense industries as new metals and composites are being integrated into products and assemblies with the goal of decreasing overall system weight. While several liquid conformal coating materials have historically offered a certain level of protection to components in these environments, these coating materials add unnecessary weight and dimension to critical, lightweight electronic, optical, and communication devices. Although commonly known, Parylene conformal coatings have provided lightweight, reliable protection for a wide range of aerospace, avionics and defense applications for over 45 years, they have been found to be useful up to 130°C. The demand, however, is growing for a Parylene that is more stable at higher temperatures with excellent electrical properties.

To address current and future high-level protection and reliability requirements, this presentation describes the development of a high temperature conformal coating, Parylene HT, which offers solutions to many existing and future protective, packaging and reliability issues of aerospace and defense assemblies, various types of sensors, optical windows, displays (including OLEDs and FOLEDs) and electronics. The high level of protection is, in part, because of Parylene HT’s excellent electrical and mechanical properties, chemical inertness and long-term thermal stability – up to 350°C long-term and 450°C short-term.

Experimental results demonstrate the ability of Parylene HT coating to meet the requirements of higher dielectric capabilities, higher temperature integrity, mechanical processing, etc., of aerospace and defense assemblies.

In addition, Parylene HT polymer coating truly conforms to the parts due to its molecular level deposition characteristics, which are particularly suited for miniaturized (micro and nano) and lightweight electronics and components.