Picosun ALD demonstrates effective surface protection for materials in space conditions

ESPOO, Finland, 22nd of March 2022 – Picosun Atomic Layer Deposition (ALD) has been demonstrated to be a suitable solution for protection of surfaces exposed to atomic oxygen degradation in Low Earth Orbit. High material survivability is a requirement for objects sent to space as they are faced with a number of degrading circumstances, such as exposure to atomic oxygen.

Researchers at the European Space Agency (ESA) have tested and analysed various material samples provided by Picosun to verify the protective coatings' suitability for protection against atomic oxygen. This testing was performed in the ESTEC TEC-QEE Laboratory LEOX facility as part of an "open lab" test campaign. These campaigns are intended to provide access to ESA’s unique space environmental test facilities and allow collaboration with ESA’s research fellows, especially for SMEs and institutes new to the space business.

The test simulates the corroding effect of atomic oxygen, for which satellites, including the International Space Station (ISS), are exposed to. The results of the tests, performed on Kapton® HN polyimide film, silicon pieces and PCBs (Printed Circuitry Boards) protected with Picosun ALD coating clearly demonstrated the erosion protection provided by the ALD coating. The demonstrated low temperature (125 °C) film was relatively thin (20 nm) enabling coating of different relevant materials. Decreased thickness of ALD coating is known to withstand more deformation required for flexible materials than thick layers. Also, ALD coating can be applied to a 3D surface with extreme aspect ratios. The analysis performed by ESTEC consisted of mass measurement, Scanning Electron Microscope (SEM) inspection and thermo-optical properties measurement, partially, before and after the test.

“Atomic oxygen erosion has a major impact on the choice of external materials available for spacecrafts and satellites operating in Low Earth Orbit. Picosun ALD showed atomic oxygen resistance in the tests and forms a suitable protective coating for extreme environmental conditions, applicable also for flexible materials”, explains Adrian Tighe, Senior Materials Engineer in the Materials’ Physics and Chemistry Section at ESA.

“ALD is an advanced thin film coating method for ultra-thin, highly uniform and conformal material layers. It has proved to be the coating solution of choice already in production in solutions and innovations operating in extreme environments. Today, they can be found everywhere from deep seabed to Mars”, says Juhana Kostamo, VP, Industrial Business Area of Picosun Group.

More information:
Juhana Kostamo
Vice President, Industrial Business Area, Picosun Group
Tel: +358 50 369 9565
Email: info@picosun.com
www.picosun.com

Picosun provides the most advanced ALD (Atomic Layer Deposition) thin film coating solutions for global industries. Picosun’s ALD solutions enable technological leap into the future, with turn-key production processes and unmatched, pioneering expertise in the field – dating back to the invention of the technology itself. Today, PICOSUN® ALD equipment are in daily manufacturing use in numerous leading industries around the world. Picosun is based in Finland, with subsidiaries in Germany, USA, Singapore, Japan, South Korea, China mainland and Taiwan, offices in India and France, and a world-wide sales and support network. Visit www.picosun.com.