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Stress-free ALD from Picosun

ESPOO, Finland, 28th August, 2018 – Picosun Group, a leading supplier of advanced Atomic Layer Deposition (ALD) thin film coating solutions, reports a method to control and eliminate stress in ALD films.

Various stresses are easily formed in ALD films during the deposition process, either inside the film or between the film and the underlying substrate. As all modern microelectronic devices are basically built by stacking ultra-thin layers of various materials on top of each other, these stresses can be detrimental not only to the film itself but to the other functional layers and structures beneath. Especially in MEMS devices, where cavities and free-standing membranes are often employed, stress-free ALD films, or films where the stress is exactly controlled, are very much sought after. Same applies for IC components, where film strains and tensions can lead to material layers detaching from each other, or bending and buckling of the whole structure.

Picosun has now developed a method with which zero stress and controlled stress ALD films can be produced. This sophisticated method is based on intricate tuning of process chemistry and deposition conditions. The desired effect is obtained with right selection of precursor chemicals and process temperature, so no additional process steps such as heat or plasma treatments (which might cause structural damage to the film) are required. Replacing a single material film with carefully designed nanolaminate of materials with opposite stress properties is another way to achieve zero stress layers. These methods have been validated with e.g. HfO_2, which is one of the key materials in microelectronics industry. Other ALD materials tested include SiO_2, Ta_2O_5, and TiO_2 (*).

“We are very pleased that we can now offer stress-free ALD HfO_2 process to our customers in MEMS and IC industries. Especially medical MEMS is an important market for us, and a prime example of an application area where controlled stress ALD films are needed to enable a whole platform of novel products. Thanks to our unmatched ALD expertise, we have now developed a solution to one of the fundamental challenges in ALD. This will facilitate the implementation of ALD to yet new, exciting applications in health technology and future IC manufacturing,” summarizes Dr. Jani Kivioja, CTO of Picosun Group.

Picosun provides the most advanced ALD thin film coating technology to enable the industrial leap into the future, with turn-key production solutions and unmatched expertise in the field. Today, PICOSUN™ ALD equipment are in daily manufacturing use in numerous major industries around the world. Picosun is based in Finland, with subsidiaries in Europe, North America, Singapore, Taiwan, China, and Japan, and a world-wide sales and support network. Visit www.picosun.com.

(*) In collaboration with VTT Technical Research Centre of Finland. Stress measurements were performed at VTT. The results were initially published in the AVS 18th International Conference on Atomic Layer Deposition (ALD 2018), Incheon, South Korea.

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