

Invited Speech:

Importance of Precision Parts Cleaning for Sub-20nm Technology Nodes



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About the Speaker

Dr. Ardeshir (Ardy) J. Sidhwa, is responsible for development and management of the Advanced Technology Cleaning Centers (ATCC) for Quantum Global Technologies (QGT). Prior to joining QGT, Dr. Sidhwa worked as a Sr. Staff Manager at ATMEL Semiconductor, Chief Operating Officer and Sr. Executive Board Director at Armor Designs, Inc and as Corporate Process Technology and Quality Director at the STMicroelectronics, Inc. Dr. Sidhwa has 23 years of innovative contributions in the R&D, management, fabrication of semiconductor devices and yield enhancement, sustainability, and design of Solar Cells. He is proficient in technology development for strategic alliances and multiple joint ventures. Dr. Sidhwa has 7 U.S. patents issued and 2 pending applications in multidisciplinary fields along with 90 publications.

Abstract

As technology nodes progress towards 20nm and beyond, the requirements for defect detection and mitigation will become increasingly stringent. Defect variability is expected to significantly impact product yields at these levels. The introduction of new processes and materials such as high-k dielectrics, metal gate electrodes, mobility-enhanced channel materials, non-planar channels and three-dimensional memory devices will further challenge component surface preparation and cleaning processes, in terms of defectivity. Component defect densities will become crucial so understanding of the Zero Defects (ZD) approach is critical in order to deliver high yield processes.

In this paper we present some of the challenges faced during the precision parts cleaning process. The main question is “Are we ready for precision parts cleaning for sub-20nm and sub- 10nm technology nodes?” Or do we plan to dispose of the parts after one use rather than recycling them through the precision cleaning process? Precision parts cleaning will impact the cost of ownership and potentially save billions of dollars per year for high volume manufacturing (HVM) semiconductor companies. However, the challenges faced today by the precision parts cleaning companies for meeting sub-20nm technology nodes are far more complex than ever before. This paper discusses some of these challenges and presents multiple examples that will be encountered during the parts cleaning process. If the cleaning process is performed inadequately, it could also negatively impact the HVM semiconductor companies in terms of overall revenue, on-time delivery, and potentially loss of business.