

II. 1 “Semiconductor Cleaning – Past and Future”

Wafer cleaning is the most frequently applied operation in a typical semiconductor device manufacturing sequence; an operation which plays a key role in determining manufacturing yield. While the exact numbers in this regard are not available in the public domain, it can be safely assumed that in an advanced IC manufacturing as many as third of all operations performed on the wafer are cleaning operations. In the case of silicon, chemistries involved and implementation of cleaning operations are very well established and backed by many years of extensive research, processing experience, as well as significant industrial tool base. However, as advanced as it currently is, silicon cleaning technology will not be able to fully accommodate diversified emerging needs of semiconductor manufacturing.

This presentation reviews state-of-the-art in semiconductor cleaning technology, identifies the most important developments which took place over the years and then discusses challenges semiconductor cleaning technology is facing as substrates other than planar wafers (e.g. 3D MOS gate stacks, Si nanowires and nanodots) and materials other than s-c Si (e.g. Ge, III-Vs, organic semiconductors) are coming to play. The conclusions drawn from this discussion is that semiconductor cleaning technology must be subjected to modifications and refinements beyond current state-of-the-art in silicon cleaning technology in order to effectively cope with the perceived needs.

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