Latest development for failure analysis – When ions meet chemistry

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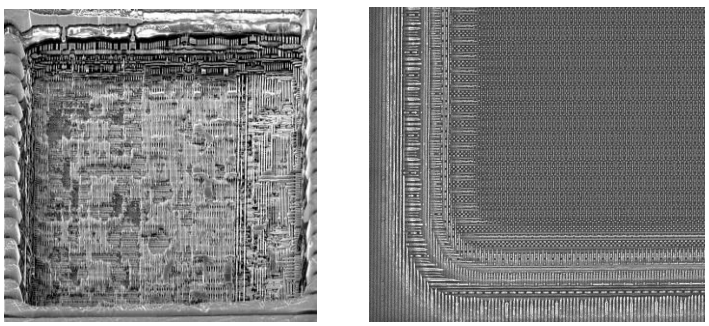
For complex high density SiP and new interconnect technologies like TSV, TEV and µ-bump, localized-defect sites have to be accessed for physical failure analysis. The demand for suitable and nano-accurate polishing technics are in growing demand to reveal, without alteration, buried interest areas. Many trials have been attempted to use a Focused Ion Beam (FIB) to remove homogeneously different metal/insulator layers. A solution is to work on ion energies, ions, spot size, type of ions… But ion beam etching alone is not able to achieve planar surface on interconnect technologies. The milling rate of different materials is too unequal and their architecture is too tricky to reach deep layers with the minimum roughness on the sample. Thus, due to a constant evolution of the material used in the semiconductors and their intrinsic tangle at the nanometric level, it becomes an increasingly pressing demand to reach, without alteration, a specific area in such complex structures.

To overcome these artifacts, a solution is to control FIB milling rates of all the different as-constitutive element of the SC's surface by adding a specific gas near the area of interest during operation. In this perspective, Orsay Physics has developed a new reliable, fast and accurate Gas Injection System (OptiGis) but also mainly amazing new chemistries.

This new gas development helps to reach a perfect layers by layer deprocessing by adjusting multi-material selectivity to offer reliable multi-chip and interconnect observations even in the nanometer and high aspect ratio ranges.



Delayering attempted without gas (left) and same process using new chemistry (right)