

Multi-scale Resolution 3D X-ray Imaging for 3D IC Process Development and Failure Analysis

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ABSTRACT

Multi-scale resolution 3D x-ray imaging with 50 nm resolution offers unique capability to new process development, failure analysis, and production monitoring of 3D IC devices. Its nondestructive nature allows parts to be imaged without sample preparation induced artifacts or time lapse imaging (4D imaging) to study failure mechanism such as current or stress induced failures. It images a large number of features simultaneously and allows quick feedback on manufacturing processes to speedup process development. The spatial resolution of 3D x-ray imaging is been continuously improved and 30nm and 50nm resolution has been developed using synchrotron and laboratory x-ray sources, respectively. The performance and application examples of two major 3D x-ray imaging systems will be presented and discussed