Micro- and Nano-NDE for Microelectronics

Norbert Meyendorf[1], Henning Heuer[1], Klaus-Jürgen Wolter[2], Martin Oppermann[2]

[1]Fraunhofer Institute for Non-Destructive Testing - Dresden - Germany

[2]TU Dresden Electronics Packaging Laboratory - Dresden - Germany

norbert.meyendorf@izfp-d.fraunhofer.de

The development speed of integrated circuits is still very high and is not expected to decrease in the next future. The integration density of microelectronic devices is increasing, the dimensions are getting smaller and the number of I/O's is getting higher. This trend is described by Moore's Law. At present structural sizes of 90 nm are state-of-the-art. In several years we will see structural sizes of 25 nm and below. Packaging has to follow this trend. Structures below the micrometer range are required to build up electronic systems from highly integrated microchips. For the safety and reliability of electronic systems, especially those that are used in long living applications, advanced techniques of nondestructive evaluation (NDE) are urgently needed. This is valid for both, the development of reliable technologies and a 100% testing of products. At present there is a gap lacking NDE techniques with resolutions better than 1 micrometer. The Fraunhofer IZFP, Dresden branch, jointly with Technische Universität Dresden has started an initiative to fill this gap. This initiative is called *nanoeva* as abbreviation for "Nondestructive **Nano-Eva**luation". The paper will present the present status and future vision of sub-nanometer NDE considered by nanoeva. Techniques like acoustic- and x-ray microscopy, near field scanning optical microscopy (NSOM), Nano-Raman microscopy, thermal wave microscopy, Atomic Force Acoustic Microscopy (AFAM) and others will be described. The principles are shortly introduced, and applications will be discussed by examples.

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