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Non-Destructive high resolution 3D imaging for Nanoelectronics

With a density of integration continuously increasing, driven by a need of an always growing power efficiency and performance, 3D integration represent today the most promising strategy to adopt for next generation packaging. Although, various designs are considered, whatever the proposed technology, all of them share the same need to find critical defects (to be correlated with failure events) or to verify the compliance of structural elements in the bulk. X-rays are a powerful tool for this kind of analysis, in particular because they allow a non-destructive approach. 3D characterisation of the device can be obtained, whilst keeping the device functionality, enabling multimodal characterisation and in-situ/in-operando analysis. However, today, the instruments delivering 3D X-ray imaging (“computed tomography”) available for conventional laboratory purposes, offer a too poor resolution, compared to the needs of nano-electronics. Thanks to the power of synchrotron radiation, this limit can be now overcome. This talk will illustrate the opportunities offered by synchrotron X-ray 3D imaging operated at the European Synchrotron in Grenoble (France) in collaboration with CEA-LETI. We will describe the

unmatched characterisation opportunity offered by the new generation nano-tomography instruments on some standard 3DIC components. This presentation will demonstrate the power of this novel investigation tool, and their importance to boost the packaging innovation. Moreover, we will describe the complementarity between synchrotron X-ray 3D imaging and other traditional nano-characterisation techniques, to offer a multi-modal/multi-scale/multi-technique approach to the future challenges of characterisation in micro and nano-electronics.

Speaker Biography

Ennio Capria is actually Deputy Head of Business Development (Experiment Division) of the European Synchrotron (ESRF). He gained his PhD in Applied Physics at Cranfield University (UK). He then undertook a series of academic and industrial positions in different sectors of nanotechnology. In his research career he has worked on the development of nanobiosensors and on nanocomposites for various applications. In 2011 he joined Elettra where he worked on manufacturing of optoelectronic devices and particularly their characterisation with synchrotron light. Finally, from September 2013 he joined ESRF as the IRT NanoElec Industrial Liaison Engineer, dedicated to the domain of micro-electronics. He has a strong background in the application of a wide range of synchrotron techniques to industrial and applied R&D problems.

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