

## **SAM3 – Shared Success with 18 Project Partners Utilising Two Funding Programmes to Secure European Competitive Leadership in New Advanced Microsystem**

SAM3, a project co-labelled by EURIPIDES<sup>2</sup> and CATRENE, has successfully delivered new diagnostic tools and analysis methods for 3D integration in advanced microsystems and materials characterization.

The SAM3 consortium, from France and Germany, consisted of four leading European semiconductor and system suppliers, ten tool providers and four research institutes. Over the 3-year project period, the partners generated numerous results with strong commercial potential. In particular, the consortium has achieved significant progress in the fields of failure localisation, device preparation and analytical characterisation in system in package (SiP) devices, e.g. applying 3D die stacking. This includes high-resolution Scanning Acoustic Microscopy for detection of interface-defects, electrical localization of failures, preparation of SiP's by means of laser, Plasma-Focused-Ion-Beam and reactive ion etching, high-resolution characterization of strain, quantitative dopant density measurements as well as surface and thermal mapping.

Advanced microsystems underpin the implementation of Europe's digital economy. The development of new applications in areas such as smart cities, automotive, energy generation and distribution, communications and computing and many others are dependent on the ability to rapidly develop and qualify the electronics systems on which these capabilities are based. The SAM3 project results are important in securing Europe's competitive advantage in these areas. They enable European semiconductor, system, equipment and diagnostic tool suppliers to meet the upcoming challenges for More-than-Moore (MtM), SiP and 3D high-density integration technologies.

With applications growing both in Europe and worldwide, there is an expanding demand for reliable, high-quality and cost-effective compact microelectronic devices that require MtM, SiP and 3D high-density integration in their design. The overall SiP market is predicted to grow at a CAGR of 8.1% between 2019 and 2025 and the global SiP packaging technology market is expected to reach USD 30 billion by 2022, growing at a CAGR of 9.0% during the forecast period 2016–2022.

The SAM3 project involving two funding countries France and Germany was set up against this backdrop to enable European companies, including SMEs, to build on existing strengths and to compete effectively through innovations in failure-analysis, material characterization, defect localization, efficient sample preparation, physical failure analysis techniques and workflows. These advances will improve the technological process during system development and device manufacturing, leading to shorter development cycles and higher reliability and quality of new products, as well as other benefits such as greater energy efficiency (particularly for 3D-SiP).

The SAM3 consortium has had access to the best resources to ensure projects attain high levels of achievement due to the 'co-labelling' nature of the project between the CATRENE and EURIPIDES<sup>2</sup> EUREKA Clusters. This experience has been carried through into the PENTA/EURIPIDES<sup>2</sup> synchronised calls, now being run annually to better serve the Electronics Components & Systems (ECS) community.