Powerbase

Pilotline 4 PowerBase 2 Compact Power Applications

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“Smart Energy” is a key application for industry to address societal challenges. Wide bandgap based semiconductors are promising candidates enabling higher frequencies and higher efficiencies whenever silicon based semiconductors reach their limits. In addition compact assembly and packaging including 3D technologies are a prerequisite for “Smart Energy” applications. Thus, the project “PowerBase” will improve the ability of the European industry to develop more efficient and more compact applications for energy generation, transformation and usage based on wide bandgap materials. The research and pilot line project “PowerBase” will follow a vertical approach from material research across the entire value chain to “Smart Energy” applications represented by PV-inverters, LED lighting systems and energy efficient end-use equipment. The Pilotline “GaN on Si incl. Epi” activities will start immediately based on research work on existing base materials. The pilot line concept will be integrated in a high volume silicon fab to assure a good price performance ratio by better utilisation of the standard equipment and significantly lower overhead cost. To reach the next level of GaN devices in terms of crystal defect density (thus enabling higher yields and better reliability) research on novel concepts for base materials is mandatory and will be performed in parallel. This includes among others novel engineered substrates and buffer layers. Assembly and Packaging of GaN is a major roadblock for the success of using GaN for power devices. The properties of GaN can only be properly used when assembly packaging with short interconnects and optimum heat dissipation is applied. This requires completely new approaches: Innovative chip embedding technologies will be investigated for their use in the first two years of the project and then applied to build up the best choice to a pilot line for GaN assembly and packaging in the last year of the project. In this project more than 30 partners from 7 European countries will work together to push Europe into a leading position to manufacture and to apply wide bandgap technologies and compact assembly and 3D packaging. The project includes large industry, several SME and world-class research centers that guarantee not only the technical success but also the exploitation of the project results. At least three pilot lines, one for semiconductor front-end technology (GaN/Si technology at IFAT Villach), one pilot line for 3D integrated light sensors (ams AG), and one for GaN assembly and packaging (IFAG Regensburg) will bring Europe into a leading position. In addition we expect innovations from the equipment and material suppliers as well as from application partners of the project.