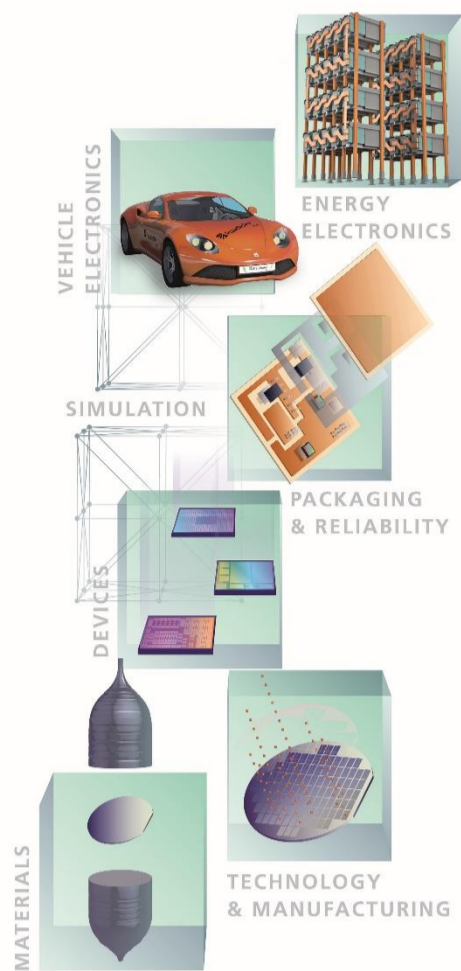


Dt: 10.04.2023

We are pleased to introduce you to Fraunhofer TechFlash - Fraunhofer's Flash News on latest and exciting technologies.

This week's TechFlash is about **"Advanced power electronic solutions for conversion, supply, and storage of electrical energy"** and **"First 1-inch Aluminium Nitride Wafer"** by **The Fraunhofer Institute for Integrated Systems and Device Technology (IISB)**

### Advanced power electronic solutions for conversion, supply, and storage of electrical energy



**The Fraunhofer Institute for Integrated Systems and Device Technology (IISB)** conducts applied research and development in the field of electronic systems for application in, e.g., electric mobility, aerospace, Industry 4.0, power grids or energy technology. In this connection, the institute uniquely covers the entire value chain - from basic materials to whole power electronic systems.

#### **Semiconductors and power electronics**

With its two business areas, semiconductors and power electronics, Fraunhofer IISB provides innovation and solutions in various specialized fields:

- Materials development
- Semiconductor technology and manufacturing
- Electron devices
- Packaging and modules
- Vehicle power electronics
- Energy electronics and energy supply systems

These services are supplemented by broad activities in test and reliability, simulation, characterization, and metrology.

In addition to silicon technology, Fraunhofer IISB has a strong focus on wide-bandgap semiconductors, especially silicon carbide (SiC). For SiC, the institute offers a complete technology backbone, including materials science, devices, modules, and their integration in highly efficient power electronic systems.

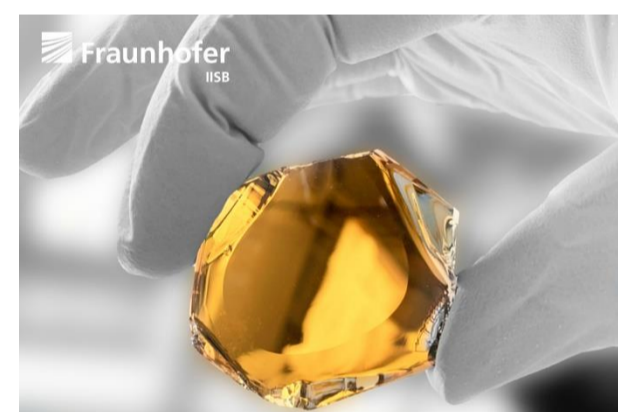
We look forward to hearing of your interest to discuss your requirement.

Yes, I am interested

### First 1-inch Aluminum Nitride Wafer by Fraunhofer IISB



Polished and finished 1-inch AlN Wafer



43 mm diameter Aluminium nitride crystal

The Materials Department at Fraunhofer IISB has succeeded in growing an Aluminum Nitride (AlN) crystal with a diameter of 43 mm in technology-relevant quality. The Nitride Materials group have taken the next step and processed the first 1-inch AlN wafers from this crystal.

The availability of AlN crystals respectively AlN wafers in sufficient size and quality is the key for the manufacturing of high performance AlN-based electronic devices. Aluminium Nitride as a semiconductor offers an extreme breakdown field strength, a high material quality, a low number of defects and a very good thermal conductivity. Due to the special physical properties of AlN, AlN-based devices for power electronics can achieve a performance beyond that of silicon carbide (SiC) and Gallium Nitride (GaN).

Thus, AlN is suitable for the processing of super-low loss power transistors and has the potential to become the most important ultrawide-bandgap (UWBG) semiconductor for power electronics in the future.

#### **Services offered**

- Growth of GaN and AlN crystals
- Epitaxy of AlGaIn on GaN, AlN and sapphire substrates up to 4" diameter
- Simulation of heat and mass transport of the HVPE and PVT process
- Identification of device critical defects in nitrides
- Characterization of crystals and epitaxial structures
  - imaging of extended defects by X-ray topography
  - defect selective etching
  - Cathodoluminescence
  - Photoluminescence
  - Raman- and FTIR spectroscopy
- Investigation of electrical properties of extended defects by conductive atomic force microscopy and electron beam induced current measurements and imaging techniques

We look forward to hearing of your interest to discuss your requirement.

Yes, I am interested

#### **About Fraunhofer-Gesellschaft:**

The Fraunhofer-Gesellschaft, headquartered in Germany, is the world's leading applied research organization. With its focus on developing key technologies that are vital for the future and enabling the commercial exploitation of this work by business and industry, Fraunhofer plays a central role in the innovation process. As a pioneer and catalyst for ground-breaking developments and scientific excellence, Fraunhofer helps shape society now and in the future. Founded in 1949, the Fraunhofer-Gesellschaft currently operates 76 institutes and research institutions throughout Germany. The majority of the organization's 30,000 employees are qualified scientists and engineers, who work with an annual research budget of 3 billion euros. Of this sum, 2.5 billion euros is generated through contract research. Our global footprint is very strong, with offices and research centres in the USA, Europe and Asia. Some of our renowned innovations are the MP3 software, white LED's and the smallest of cameras.

Fraunhofer has been a long-time trusted innovation partner in India, collaborating with some of the major players in the field of Material Science, Energy, Environment, Automotive, Electro-mobility, Production Technology and Smart Cities, working with Industry, Government and Public Sector.

Kindly contact Mr. Aditya Fuke, Manager – Smart Cities & IoT at Fraunhofer Office India for further details.

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