Press Release

High-performance ion implantation – the basis for innovative semiconductor devices

Berlin, May 26, 2021

The Berlin-based Ferdinand-Braun-Institut (FBH) recently put a sophisticated ion implanter system from High Voltage Engineering Europa B.V. into operation. The highly versatile tool extends the technological capabilities of FBH for in-house research and customer processes. With three different ion sources and the ability to heat substrates, the implanter is ideally suited for the development of innovative semiconductor devices. Among other things, the system enables doping implantations of wide-bandgap semiconductors, whose outstanding material properties are to be used in future power electronics applications.

Ion implantation is one of the key processes in manufacturing microelectronic devices, which is used to introduce foreign atoms into semiconductor layers. In this process, charged particles (ions) are shot at semiconductor materials and thus introduced (implanted) into a material layer. With this key technology of the semiconductor industry, material properties can be modified in a targeted manner.

Flexible system for compound semiconductors and special substrates

The novel ion implanter offers high implantation currents of up to 2 mA and covers acceleration voltages from 5 keV to 500 keV. This allows materials to be systematically modified even at high implantation doses within industry-compatible process times. A sputtering source can also be used to implant materials with very high melting points, such as the special metals tungsten, molybdenum, tantalum, and niobium. This opens up further technological possibilities. In addition to a gas source, the system is equipped with two furnaces to implant low melting metals. The new implanter offers another special feature: with a special sample holder, substrates can be heated up to 500 °C. This enables activation of the dopants during implantation, for example in wide-gap semiconductors. The possibilities for selective isolation and doping make the new ion implanter an important technical foundation at FBH for the development of innovative planar integration processes in materials like gallium nitride, aluminum nitride, and gallium oxide.

The procurement of the ion implanter and the required installation work in the cleanroom was funded by the Federal Ministry of Education and Research (BMBF) within the framework of "Research Fab Microelectronics Germany (FMD)" (funding reference 16FMD02).
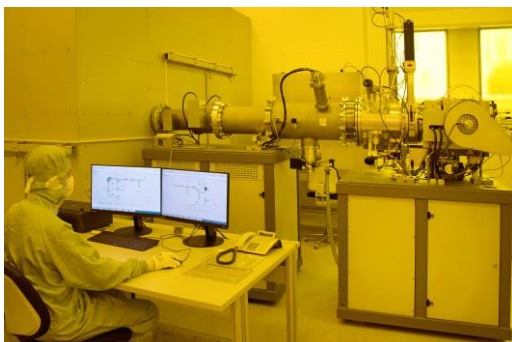
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The press picture is available here for download. All images are copyrighted.

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About the FBH

Ferdinand-Braun-Institut, Leibniz-Institut fuer Hoechstfrequenztechnik (FBH) researches electronic and optical components, modules and systems based on compound semiconductors. These devices are key enablers that address the needs of today's society in fields like communications, energy, health, and mobility. Specifically, FBH develops light sources from the visible to the ultra-violet spectral range: high-power diode lasers with excellent beam quality, UV light sources and hybrid laser systems. Applications range from medical technology, high-precision metrology, and sensors to optical communications in space and integrated quantum technology. In the field of microwaves, FBH develops high-efficiency multi-functional power amplifiers, and millimeter wave frontends targeting energy-efficient mobile communications as well as car safety systems. The FBH has a strong international reputation and ensures rapid transfer of technology by working closely with partners in industry and research. The institute has a staff of 350 employees and a budget of 39.1 million euros. It is a member of the Leibniz Association and part of »Research Fab Microelectronics Germany«

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