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NoMIS to provide SiC power semiconductor devices and modules

NoMIS Power Group, a spin-off of State University of New York Polytechnic Institute (SUNY Poly), began from a research effort begun in September 2019, when postdoc Dr Adam Morgan connected with associate professor of Nanoengineering Dr Woongje Sung and his students to help them further evaluate their silicon carbide (SiC) power semiconductor devices beyond on-wafer measurements.

Spearheading a project proposal to the New York State Center for Advanced Technology in Nanomaterials and Nanoelectronics (CATN2) matching investment program, and in partnership with Indium Corporation, the group received funding in 2020. As a result, SUNY Poly and Indium Corporation have been evaluating advanced packaging materials (die attachments and thermal interface materials) and their compatibility with the SiC devices.

"The performance of the SiC devices produced were on par, if not better, in some key aspects than what is commercially available," says Morgan, based on the successful outcomes of Sung's projects. "At the same time, the rising interest globally in clean tech was making it clear that a growing market exists for the SiC device technologies we are working on," he adds.

Because Morgan's expertise revolves around making the SiC bare chips usable by applications engineers by means of packaging the SiC chips using supporting material systems with high-power terminations (allowing them to be usable in power electronic circuits), the research team felt they had the necessary technical background to turn the technology into a product. They hence formed NoMIS (Novel Materials and Innovative Semiconductors Power Group.

The near-term goal of NoMIS is to design, manufacture and sell SiC power semiconductor devices, modules and associated services that are currently unavailable on the market in order to provide enabling 21st century technology that supports power management product developers (i.e. power electronics engineers who are operating in the electric vehicle (EV) fast-charger, heavy-duty EV, traction locomotive, marine electrification, and industrial motor drive markets) as they work on next-generation, efficient and reliable clean tech products/solutions.

Along with co-founder, technical & business advisor Dr Anant Agarwal (a professor at The Ohio State University), the following SUNY Poly experts are the driving force behind the company:

- Dr Adam Morgan: co-founder, CEO and technical lead of power packaging efforts;
- Dr Woongje Sung: co-founder, technical lead of SiC device design; and

- Dr Shadi Shahedipour-Sandvik: co-founder, technical lead of wide-bandgap material and GaN device design, SUNY provost-in-charge and SUNY Poly interim VP of Research and Graduate Studies.

“SUNY Poly is well connected to the rapidly growing technology ecosystem of New York State (NYS) and is strongly supported by government, industry and research institutions,” notes Morgan. “This puts its students at an advantage of getting to be a part of it all.”

Currently, NoMIS is focused on scaling the production of larger SiC chips and multi-chip modules in the form of available prototypes, as well as customer discovery efforts. Within five years, it aims to have established a diversified, reliable supply chain capable of mass producing its SiC technology and, in parallel, partner with several customers and researchers to perform rigorous field demonstration testing that shows off the technology’s performance in order to attract additional customers.

It is anticipated that NoMIS’ products could lead to the deployment of more clean technologies, from large-scale residential and commercial photovoltaic (PV) solar and wind generation coupled with energy storage to electrified transportation, or high-speed industrial motors, for example.

Already, NoMIS is a semi-finalist for the American-Made Solar Prize competition; a competition funded by the US Department of Energy (DoE) that would award the firm $3m to help develop the technology for its potential use to integrate solar technology on the grid.