May 2024

Tel Aviv University Center for Nanoscience and Nanotechnology

TAU.nano - Newsletter

NEW BUILDING

The inauguration of the Roman Abramovich Building for Nano and Quantum Science & Technology, which will house the Jan Koum Center for Nanoscience and Nanotechnology and 14 Researchers' labs, marks a pivotal moment in Israel's research and technology landscape. This facility, envisioned over a decade ago, is set to be inaugurated at the 2024 Board of Governors (BOG) on May 29.

Following the ceremonies at the BOG, both research labs as well as student and staff offices will be relocated to the facility. The next phase, starting in autumn 2024, will involve the installation of a clean room with approximately 100 pieces of equipment, a process expected to take about a year. Once completed, the clean room will significantly enhance the center's ability to advance TAU research. Funded through the generous donation of multiple donors, TAU.nano represents the fusion of academic excellence and industry needs, positioning Israel at the forefront of technological advancements.

NANO STAFF

- The Jan Koum Center for Nanoscience and Nanotechnology would like to welcome Dr. Gregory Kopnov to its team! Dr. Kopnov will be responsible for deposition tools like ALD and PECVD, as well as characterization techniques including ellipsometry, spectroscopy and AFM. Dr. Kopnov holds a PhD in Chemical Physics from the Weizmann Institute of Science and is joining the Center after distinguished postdoctoral work at the Weizmann Institute and CNRS in France. Previously, he was a researcher and lab manager at Tel Aviv University's Spintronics and High Magnetic Field laboratory.

- We are actively seeking an outstanding individual to join our team as Electron and Ion Beam Microscopes specialist. For more details about this opportunity, please visit our open positions page

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EQUIPMENT

In preparation for our new building, we've acquired cutting-edge equipment to bolster our capabilities in thin film deposition, dry etching, and fabrication:

- 200mm CORIAL 210 ICP-CVD will enable precise film deposition, even at low temperatures, facilitating conformal coating and "lift-off" processes.
- 200mm CORIAL 210IL-187 ICP-RIE, designed for stable etch rates and uniformity, particularly suited for deep substrate etching processes.
- 200mm CORIAL 210IL-189 ICP-RIE designed to optimize fluorine-oxygen-based plasmas, ideal for etching silicon oxides and oxide glasses.
- EVATEC BAK501 E-GUN evaporator with ion assisted deposition capabilities. An industrial-grade e-gun evaporator supporting multilayer deposition of metals and dielectrics with precise control and uniformity. This tool moved in last week!
- VST multifunction PVD system TFDS 6400. A cluster tool offering comprehensive thin film deposition capabilities with automatic control and high precision.
- Semi-Automatic Surface Grinder DiscoDAG810 to enhance wafer thinning and fabrication capabilities, ensuring precision and surface finish crucial for semiconductor manufacturing.

For more details, follow the link: TAU.Nano new equipments

Unfortunately, our deep RIE tool, Verseline, suffered damage from an electrical shortage and watersplash, rendering it non-operational. However, we have completed the purchasing a new deep RIE tool to restore this capability in our center.

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CHARACTERIZATION CAPABILITIES

Our recent seminar highlighted the exceptional capabilities we offer in characterization science. We unveiled our latest tools, carefully designed to improve accuracy, and offer deeper insights in the field. These include the cutting-edge HRSEM Apreo with cathodoluminescence functionalities, the comprehensive exploration enabled by our new TEM Spectra, and the unparalleled precision of the Dual Beam Helios 5 FIB. Furthermore, our upgraded XPS capabilities promise a deeper understanding of material composition and surface chemistry, paving the way for groundbreaking discoveries.

With these advancements, we're exploring materials with unprecedented detail and uncovering previouslyunseen insights.

ACADEMICAL RESEARCH

The Smith-Purcell effect offers potential for compact light sources driven by coherent free electrons across the electromagnetic spectrum. Despite inherent challenges, a recent collaboration led by Prof. Adi Arie and Dolev Roitman, with Aviv Karnieli, PhD, Shai Tsesses, and Zahava Barkay at the Jan Koum Center for Nanoscience and Nanotechnology, successfully achieved Smith-Purcell light emission from UV to visible wavelengths using engineered gratings. Utilizing electron energies as low as 300 eV and small periodicities of 19 nm, this work marks significant progress in the development of on-chip light sources. It also paves the way for observing quantum recoil effects and creating tunable EUV and X-ray sources.

Click here for the full article.

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ACADEMICAL RESEARCH

Exciting insights from our recent visit to Prof. Ishay Pomerantz Lab! The nuclear photonics research group (NePTUN) uses a powerful 20-Terawatt laser to explore how intense light interacts with matter. Their experiments cover a broad spectrum, probing electrons, protons, x-rays, and neutrons emitted from targets.
Their goal is to unravel the origins of various radiations for potential applications in research, security, and medicine – such as using proton radiation for cancer treatment or enhancing cargo container scans with neutron radiation. They are driven to develop compact, cost-effective radiation generators to revolutionize these fields.

In close partnership with Prof. Ishay Pomerantz's team, our Center fabricates crucial targets for these experiments. When the intense laser interacts with a target, particles are accelerated, and different target types result in different interactions that can favor different acceleration mechanisms. These targets range from simple flat membranes to intricate nanometric structures and mass- limited formations. Many results have been obtained from repeated irradiation of dozens of targets, facilitated by an automated delivery system focused on the laser.

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