

NANONEWS

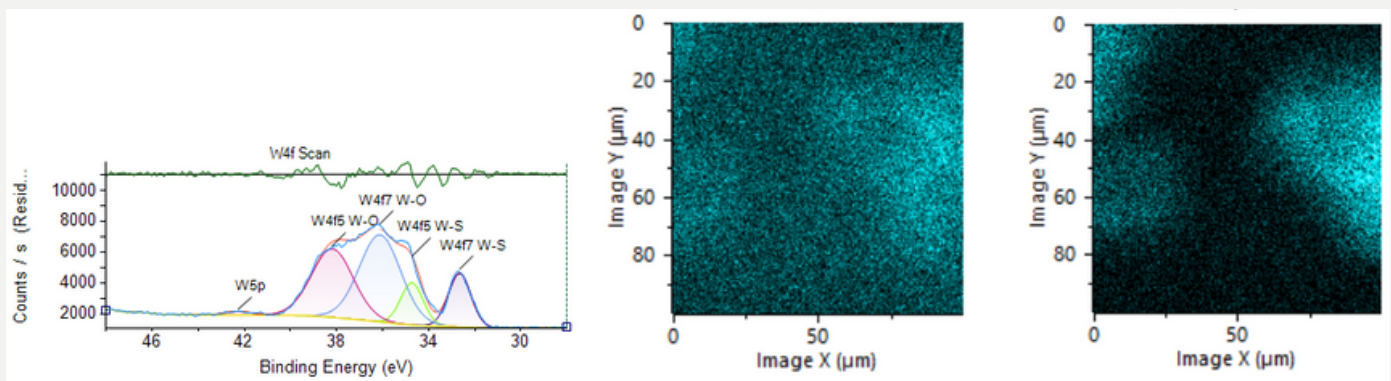
May 2022

New Equipment

XPS X-ray photoelectron spectroscopy

The new XPS system- ESCALAB™ QXi by Thermo Fisher - was installed.

At its heart, the QXi has a dual detector system for fast and accurate XPS high resolution analysis and superb imaging with an excellent spatial resolution. The new TAU Nanocenter system is configured with a plethora of options that are aimed at both answering deep scientific questions and meeting all the demands from industrial R&D. Among of its capabilities are full periodic table compositional and oxidation state analysis, complete electronic structure determination, multiple imaging techniques, depth profile conditions, surfaces coverage analysis and more. It is possible to map different oxidation states of one atom and locate them in lateral space, or even collect a series of images and extract the spectrum from a specific region retroactively.



Figures: spectrum and imaging of the W-S and W-O bond energies of WS₂ triangular islands on top of a WO₃ film. Images show clear triangular shapes for the WS₂ bond. Lateral resolution ~3 micron.

Samples courtesy of Assael Cohen, Prof. Ariel Ismach's lab, materials engineering, Tel Aviv University.

TEM Transmission electron microscopy

We have made significant progress on our TEM fleet replacement, Tecnai F20 shall be replaced by a similar, 'classical', atomic resolution TEM, the Talos F200i by Thermo Fisher. The lab preparation has been started and Talos is expected to become operational by July, assuming everything goes smoothly. From now on, Tecnai F20 microscope will not be in service, This is to allow for the Talos F200i pre-installation operations to unfold. Tecnai F20 has served TAU for 23 years, since 1999. The JEM-2010F microscope will operate as usual through August. Consequently, it would fill in most of the gap between the retirement of Tecnai F20 and the actual inauguration of Talos F200i.

New Equipment

I-V/C-V METER Electrical analyser by Keithley

A new and advanced electrical analysis is now available for nano community, a solution for the electrical characterization of a variety of devices and materials.

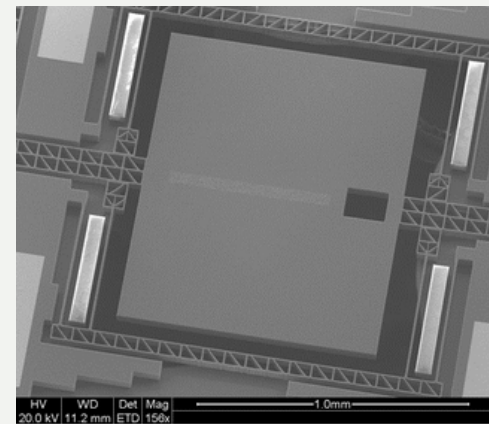
- Applications: device modelling • process development • characterization • reliability • lifetime testing • failure analysis
- Materials: semiconductors • organic semiconductors • metals • semimetals • oxides, transparent conductive oxides • nanocomposites • metamaterials • 2D materials
- Devices: resistors • capacitors • diodes • transistors • memory devices • batteries • MEMS devices • image sensors • bio sensors



Fabrication Equipment recap

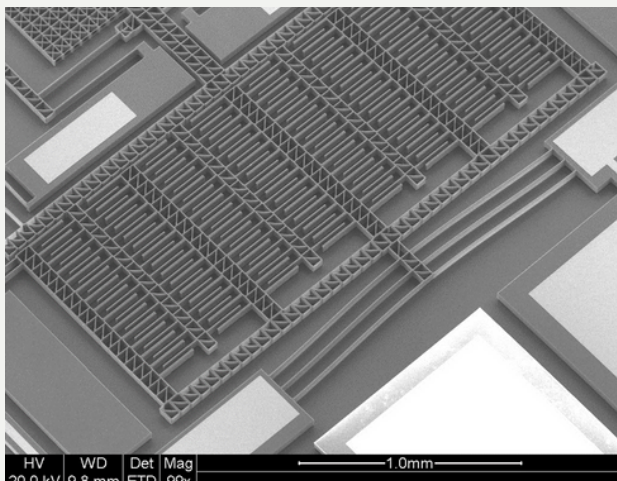
DEEP REACTIVE ION ETCH - VERSALINE® by Plasma-Therm

The Versaline deep silicon etch (DSE) is a Bosch process based, deep reactive ion etcher (DRIE). Combining chemical and physical etching with a passivation step enables the process to control the lateral etch rate while enhancing the vertical etch rate.



The Bosch process is the most common DRIE method due to its high etch rate.

The Versaline DSE offers short process step times for smooth side wall; fast and stable pressure control; parameter morphing control; sub-zero electrode cooling. A new process has been developed recently for etching Silicon bonded to glass with an ultra high aspect ratio DRIE of over 1:35.



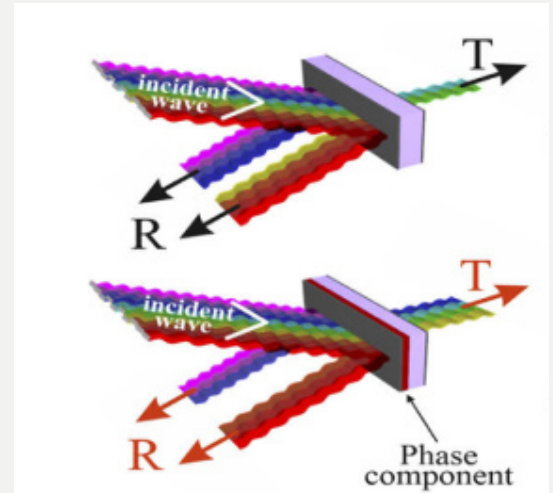
Images of devices fabricated by Erez Benjamin from Prof. Slava Krylov's group

Nanotechnology Research

ELIMINATING REFLECTIONS OVER BROAD SPECTRAL RANGE

Researchers from TAU's department of Physical Electronics and School of Electrical Engineering, led by Profs. Koby Scheuer and Pavel Ginzburg, have developed a new approach for eliminating reflection of broadband light from optical interfaces. The approach utilized the concept of "white light cavity", a structure of carefully designed thin optical layers, in order to generate destructive interference in the reflection direction over a wide range of wavelengths. The concept can have tremendous impact on the development of future optical systems, screens, communication systems, and stealth technologies. The new approach is universal and could be adjusted for eliminating reflections of any kind of wave (radio, microwave, sound, pressure, etc.).

<https://opg.optica.org/oe/fulltext.cfm?uri=oe-30-4-5192&id=469144>



New Building



On schedule and in high gear, the new Nanocenter building is being constructed. We just completed an important milestone – issuing of the clean room construction bid -and the vendor will be selected by the end of the month. Since the building plans were created six years ago, revisions were needed on all fronts. It has been our major focus these past months, and we have made modifications such as clean room and Nanocenter labs layout, the interior of the research labs on floors 1 and 2, and a refinement of the facility systems requirements. We are thrilled to walk by the building and see the daily progress.

New staff members



ANASTASIIA ADELBERG

Anastasiia joined the Nanocenter in March . You can also call her Nastya. She is from St. Petersburg, Russia. She holds a PhD in Optics and Lasers. In 2014, she moved to Israel. For the past seven years she worked at TAU in the laboratory of Prof. Arie Ruzin, Electrical Engineering.

She enjoys spending time with her husband and friends . She loves to walk, photography and enjoys delicious food.

Nastya's is a process engineer and she is responsible for mask design and fabrication and acts as the Heidelberg tool owner

SERGIO BLOCH

Sergio joined the Nanocenter in March after 25 years in the semiconductor industry. He has an extensive experience with film deposition systems and processes.

He is married and is a father of 6 years old twins. His hobbies include traveling and cooking.

Sergio is working at the center as a process engineer and he is responsible for the deposition tools.



EREZ BENJAMIN

Erez joined the Nanocenter in May after 8 years as a PhD Student . He holds a BSc in electrical engineering from the Technion and MSc from TAU.

Erez's Academic interests include design and fabrication of MEMS devices.

Erez is working at the center as a process engineer and a he is responsible for Photolithography and Dry etch technologies.

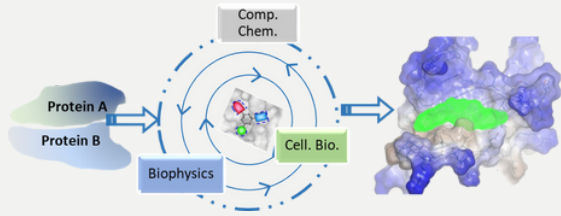


New Researchers



DR MAAYAN GAL

Dr. Maayan Gal is a new faculty member in the Faculty of Medicine. He completed his PhD studies at the Chemical Physics Department in the Weizmann Institute, focused on the development of new magnetic resonance methods for monitoring bimolecular events. He then continued as an HFSP postdoctoral fellow to Harvard Medical School working on protein interactions aiming to decipher the structure-function relation of T-cell activation switch proteins, NFAT and calcineurin. He then joined as a leading researcher to Migal-Galilee research institute. The lab in TAU was established on Oct-2019 and is focused on the discovery and development of novel protein modulator as the basis for new therapeutics. The main interest is the challenging targets belonging to the biological space of protein-protein interactions (PPIs). To study and discover new modulators we are integrating cutting-edge computational, biophysical and cellular biology tools, aiming for the development of new optimized proteins as biomarkers and therapeutics.

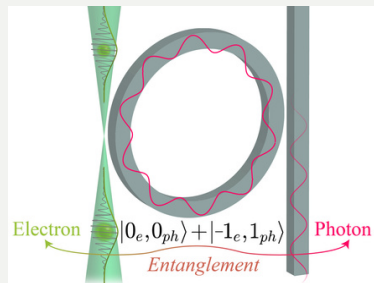


DEVELOPMENT OF DISCOVERY "ENGINE" - AN EFFICIENT AND INNOVATIVE TECHNOLOGICAL PLATFORM TO STUDY MOLECULAR RECOGNITION FOR THE STUDY AND DISCOVERY OF NEW BIO-ACTIVE MOLECULES



DR OFER KFIR

Dr. Ofer Kfir recently moved to TAU after finishing a post-doc position in *Gottingen, Germany*, playing with ultrafast electron microscopes. His new group at Tel Aviv investigates the entanglement between electrons in a nano-focused beam and localized optical excitations. The research aims to demonstrate electron-photon entanglement, quantify it, and find the pathways through which quantum information leakage occurs. Positioned in the Faculty of Engineering, he tries to harness the discovered interactions of electrons and matter to enable new functionality.

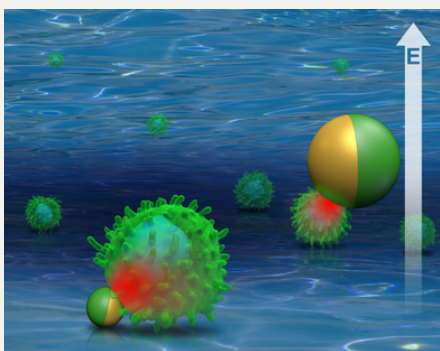


In quantum mechanical descriptions, the interaction between two quantum entities (say qubits) conserves information and energy, where reversible (unitary) quantum operations move the system until its measurement. Such two systems would be entangled, for example, in a superposition of one gaining some energy and the other losing some, or vice versa. However, the typically rapid coupling to unresolved and inaccessible states, referred to as "the environment," collapses the quantum state and erases such superposition. When considering material candidates for hosting quantum information nodes (e.g., diamonds with color defect centers), the spatial and spectral mapping of the energy-state landscape and the corresponding coupling rates becomes crucial.



PROF. GILAD YOSSFIFON

In October 2021, Prof. Gilad Yossifon joined the School of Mechanical Engineering at Tel-Aviv University, after transitioning from the Technion, where he worked since 2009, to establish the Micro- and Nano-Fluidics and Robots (MNFR) laboratory. Prof. Yossifon has a diverse academic background including BSc, MSc degrees in Mechanical Engineering from the Technion, another MSc degree in Electrical Engineering from TAU, PhD degree in Mechanical Engineering from TAU and post doctorate in the Chemical and Biomolecular department at the University of Notre Dame. His research interests lie in the area of electrokinetics in micro- and nano-fluidics, active (self-propelling) particles, micro- and nano-robots and lab-on-a-chip devices. Examples of recent technology that emerged from his lab consist of novel electro-chemical microfluidic flowmeter for drug delivery applications, lab-on-a-chip device for safe sorting and isolation of rare spermatozoa, microrobots for precise local electroporation and gene transfection of mammalian cells etc. More details on his group's research can be found in <https://www.micronanofluidics.sites.tau.ac.il/>.



Nano Community Events

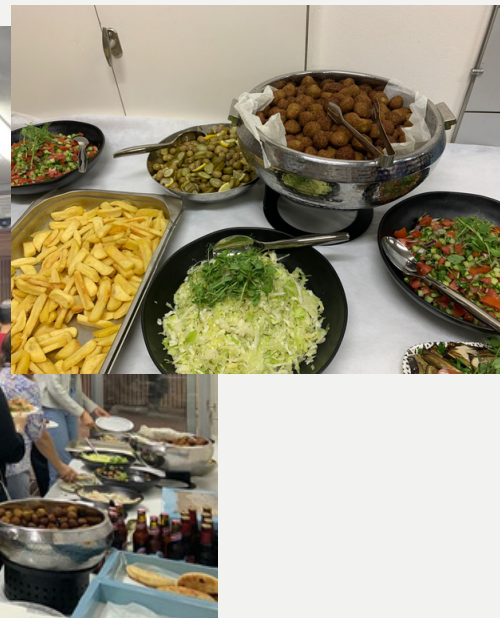
THE 13TH FRED CHAOU L NANO-WORKSHOP

Thanks to all of you for joining us at the TAU Nanocenter annual conference. We had an incredible time meeting so many lovely people and listening to such interesting talks. Can't wait for next year.



INDEPENDENCE DAY NANOBEAR

On May 1st, we had our quarterly Nano-Bear and also a toast to celebrate the 74th independence day



Nano Community Events

ISM2022
The 55th Annual Meeting of the Israel Society for Microscopy
May 17, 2022 | Sammy Ofer Stadium, Haifa

האגודה הישראלית למיקרוסקופיה
THE ISRAEL SOCIETY FOR MICROSCOPY

TECHNION
Israel Institute of Technology

May 16, 2022 - WORKSHOP
ISM2022 workshop on "Ultra-high Spatial and Temporal Resolution in Electron Microscopy" / Technion
Register at: <https://www.ism2022.org/registration>

May 17, 2022 - ISM MEETING

PLENARY SPEAKERS
Ahmet Yildiz, UC Berkeley, USA
David W. McComb, Ohio State University, USA

INVITED SPEAKERS
Leeat Keren, Weizmann Institute
Alon Zaslaver, Hebrew University
Yuval Ebenstein, Tel Aviv University
Moran Oved-Levitt, Bar-Ilan University
Ofar Kfir, Tel Aviv University
Charlotte Vogt, Technion
Osp Schwartz, Weizmann Institute
Benjamin J. McMoran, University of Oregon, USA

MEETING DEADLINES
March 1, 2022 Margulis & Mutsaers Prizes application
March 1, 2022 Abstract submission
March 30, 2022 End of early registration
March 30, 2022 Images for the Micrograph Competition

THE LEV MARGULIS PRIZE
Will be awarded to a student from **Materials Science**

THE YAEEL MUTSAERS PRIZE
Will be awarded to a student from **Life Sciences**

Poster Competition | Micrograph Competition | Vendors Exhibition

ORGANIZING COMMITTEE

Yaron Kauffmann, Technion	Yuval Garini, Technion
Zahava Barkay, TAU	Yaron Shav-Tal, BIU
Yafit Flegler, BIU	Aryeh Weiss, BIU
Amit Kohn, TAU	Yossi Tal Yosef, BIU
Assaf Gal, WIS	Leah Gheber, BGU
Ifat Kaplan-Ashiri, WIS	Gabriel Frank, BGU
Lothar Houben, WIS	Natalie Elia, BGU
Tamar Segal-Peretz, Technion	Inna Popov, HUJI
Tom Schultheiss, Technion	

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Yuval Garini, Technion	Ifat Kaplan-Ashiri, WIS
Yaron Shav-Tal, BIU	Lothar Houben, WIS
Natalie Elia, BGU	Inna Popov, HUJI
David Spitznack, TAU	Ido Kaminker, Technion
Eilon Sherman, HUJI	

MEETING: ע'ר א'ר א'ר א'ר
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meeting@ierenhaus.co.il

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TECHNION Israel Institute of Technology
RONI The Russell Berrie Nanotechnology Institute (RBNI), Technion
TEP Tevel Technion Energy Program
BINAT Bar-Ilan Institute of Nanotechnology & Advanced Materials Bar-Ilan University
The School of Engineering Technion

<http://www.ismicroscopy.org.il/ism2022/>

ISM2022

The 55th Annual Meeting of the Israel Society for Microscopy will be held on Tuesday May 17th, 2022 at the Sammy Ofer Stadium, Haifa.

The annual meeting will be preceded by a tutorial workshop on the topic of Ultra-high Spatial and Temporal Resolution In Electron Microscopy on Monday May 16th, 2022 at the Technion

Please come see us at our exhibition booth

TAU Nanocenter Summer School

The in-person 4-days summer school will focus on electronic, optical, and mechanical phenomena stemming from the various stacking configurations and interlayer interactions in van der Waals structures (vdW).

The school aims for a broad audience of graduate students (MSc and PhD) through post-docs, scientists, and engineers who wish to develop in the field.

The sessions include tutorial talks by international experts, dedicated work-shop sessions on recent challenges/ opportunities, and a student poster competition.

Tel Aviv University Nano Center Summer School 2022 on

Quantum Materials Design by vdW Stacking, Sliding and Twisting

The in-person 4-days summer school will focus on electronic, optical, and mechanical phenomena stemming from the various stacking configurations and interlayer interactions in van der Waals structures (vdW). The school aims for a broad audience of graduate students (MSc and PhD) through post-docs, scientists, and engineers who wish to develop in the field. The sessions include tutorial talks followed by dedicated workshop sessions on recent challenges/opportunities, and a student poster competition. Research collaborations are further encouraged by social events that introduce the local research atmosphere and culture, including a half-day tour.

June 12 - 15, 2022 | Tel Aviv University

Scope

- Emergent orders (correlated metals, insulators, magnets, ferroelectricity)
- Super-lubricity, strain engineering, and vdW mechanics
- Moire' physics in mismatched hetero-layers and twisted homo-layers
- Non-equilibrium excitations

Chairs
Volodya Falko (Manchester)
Jonathan Ruhman (BIU)
Moshe Ben Shalom (Tel Aviv University)

Venue
Tel Aviv University

Program
The Program is Available at the website

Poster Presentation
Students are encouraged to present a poster, and their work in a dedicated Poster Flash Session (up to 2 minutes per speaker)

Best Posters will be Awarded!!!
Posters can be submitted by June 1, 2022.

Registration:
Is available at the website

Foreign Students Support
Tel Aviv University Nano Center Summer School 2022 would like encourage and support graduated foreign students to attend the meeting. Further details can be found at the website.

Speakers
(partial alphabetic list)
Eric Akkermans (Technion-Israel Institute of Technology)
Haim Beldenkopf (Weizmann Institute of Science)
Erez Berg (Weizmann Institute of Science)
Yan Binghai (Weizmann Institute of Science)
Yoram Dagan (Tel Aviv University)
Itai Epstein (Tel Aviv University)
Vladimir Falko (The University of Manchester)
Bilal Gendard (Heriot Watt University)
Moshe Goldstein (Tel Aviv University)
Roman Gorbachev (The University of Manchester)
Asaf Hamo (Bar-Ilan University)
Moshe Harats (Ben-Gurion University)
Nicholas Hine (University of Warwick)
Oded Hod (Tel Aviv University)
Shahal Itani (Weizmann Institute of Science)
Beena Kalisky (Bar-Ilan University)
Amit Keren (Technion-Israel Institute of Technology)
Eiad Koren (Technion-Israel Institute of Technology)
Johannes Lischner (Imperial College)
Eran Maniv (Ben-Gurion University)
Artem Mishchenko (The University of Manchester)
Doron Naveh (Bar-Ilan University)
Yuval Ronen (Weizmann Institute of Science)
Jonathan Ruhman (Bar-Ilan University)
Eran Sela (Tel Aviv University)
Efrat Shimshoni (Bar-Ilan University)
Hadar Shteinberg (The Hebrew University of Jerusalem)

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