Yizhaq Engelberg, Ph.D.

Expertise Summary

MIT derived entrepreneur with extensive expertise in synthetic biology and protein engineering, specializing in self-assembly based functionalization. With over 8 years of research experience and more than 10 years of leadership experience, adept at leading multidisciplinary teams to achieve mission objectives and operational success. Skilled in managing comprehensive projects, conducting risk assessments, and making critical decisions to drive innovation. Recipient of 8 prestigious competitive awards, recognized for analytical thinking, flexibility, and effective verbal and written communication with diverse audiences. Experienced in overseeing project progress, reporting to funding agencies, and translating research findings into impactful applications across various fields.

Technical Skills

Synthetic and Molecular Biology	Directed evolution and high throughput experimental design, cloning, DNA assemblies, directed evolution, microbiology.
Biochemistry	Protein quantification, chromatography (IEC, IEX, SEC, affinity, AKTA, etc), structural biology, TFF, ELISA, tissue cultures.
Analytical Techniques	Spectrometry, ATR-FTIR, CD, DSC, FACS, DSF, ELISA, gel electrophoresis, DLS, flow cytometer and FACS.
Imaging and Microscopy	Confocal microscopy, TEM, cryo-EM, hyperspectral imaging and image analysis.
Software and Computational Tools	Bioinformatics tools, Adobe Photoshop and Illustrator, ImageJ, AlphaFold, GraphPad, FlowJo, Python (basic), Snapgene, CCP4.

Professional Skills

- Team leadership, cross-functional collaboration, stakeholder engagement, project management.
- Curriculum design, experiential teaching, inclusive mentoring.
- Strategic planning, proposal writing, effective science and social communication.

Research Experience

Postdoctoral research | Synthetic biology and biological engineering | **09/2022 – present**

Massachusetts Institute of Technology (MIT), Cambridge, USA
Supervisor: Prof. Chris Voigt

- **Lead Researcher** in a collaborative program with private defense contractors, participating in a multi-disciplinary consortium to rapidly engineer microbiota for cutting-edge underwater and ground sensing applications.
- **Cross-Disciplinary Project Leadership and Translation:** Led and coordinated multidisciplinary research teams across microbiology, synthetic biology, materials science, and engineering. Oversaw project timelines, facilitated effective collaboration, and ensured seamless integration of research into applied technologies. Acted as the primary liaison with funding agencies, delivering detailed progress reports and driving the translation of scientific outcomes into real-world applications for defense and environmental use.
- **Environmental Biosensing Innovation:** Led the development and optimization of advanced bacterial biosensors for environmental monitoring by integrating strategic genetic circuit design, directed evolution, and high-throughput screening. Engineered novel genetic pathways enabling secretion of complex pigments with hyperspectral signatures, significantly enhancing the visual and spectral sensitivity of biosensors for detecting heavy metals and other environmental signals.
- **Microbiota Engineering**: Developed advanced genetic tools for engineering extremophile microbiota sourced from extreme natural environments. The goal of this work is to domesticate these organisms for the fabrication of functional living materials, including bio-concrete and biopaint, to enhance durability and performance in construction materials.

Direct Track Ph.D. | Biochemistry and Biophysics | **10/2017 – 08/2022**

The Technion, Israel
Supervisor: Dr. Meytal Landau
Ph.D. thesis title: “Functional Supramolecular Structures of Self Assembled Proteins”

- **Structures and Activity Relationship**: Led the development of crystallization techniques and pipelines to investigate self-assembling peptides and proteins. Successfully determined X-ray atomic structures, providing insight into the fundamental mechanisms driving proteins self-assembly. Examined how atomic, nanometric, and micrometric structures of self-assembling peptides correlate with their activity. Identified key structural features that influence peptide efficacy against bacterial pathogens with minimal toxicity, contributing to the development of new antimicrobial agents.
- **Oral Delivery System Development**: Engineered a novel and highly effective oral delivery system using self-assembled food proteins and lipids, designed for the controlled release of poorly soluble compounds. This system demonstrated enhanced bioavailability and stability, crucial for pharmaceutical and nutraceutical applications.
- **Engineered Peptide Development**: Designed and synthesized engineered peptides with controllable self-assembly capabilities. These peptides exhibited tunable physical-chemical properties, resulting in enhanced biological and electrical activity, offering promising applications in drug development and biomedical engineering.
- **Mentorship and Teaching**: Provided mentorship and guidance to graduate and undergraduate students over 6 years. Delivered lectures, conducted laboratory sessions, and

supervised research projects, fostering a collaborative and dynamic learning environment for emerging scientists.

Outside the Academy and Outreach Experience

Founder and CEO | Stealth mode biotech company **2025 – present**

Building a venture focused on delivering elegant, science-driven solutions to reduce crop losses caused by bacterial pathogens. Our approach emphasizes high effectiveness, cost-efficiency, and minimal regulatory burden, positioning us to outperform conventional agrochemical treatments.

Leading all aspects of company development, from product strategy and technical validation to investor engagement and go-to-market planning. Driving early-stage R&D and translating scientific insights into scalable, field-ready interventions. Actively building partnerships, securing feedback from growers and stakeholders, and refining business models aligned with real-world agricultural needs. Participated in I-corpse, refining the company's scientific direction and business strategy alongside a network of top-tier mentors.

Scientific and Strategic Consulting | Stealth mode pharma company **2024 – present**

Participated in Nucleate's Activator program. Investigating potential chemical targets to guide our scientific and business strategy. Engaging with investors to secure funding and build partnerships. Shaping the startup's roadmap through strategic planning and insights. Driving growth by bridging science and business development. Participated in Nucleate's Activator program for young entrepreneurs.

Teaching & Program Facilitation | The Technion & MIT **2017 – Present**

• Taught undergraduate and graduate biochemistry courses, integrating lab-based learning and student mentorship.

• Co-facilitated the LEAPS leadership program, leading workshops and mentoring early-career scientists in communication and career development.

• Collaborated with faculty and institutional partners to align teaching goals, resolve challenges, and enhance program effectiveness.

Team Leader & Investigations Specialist | government, Israel **2007 – 2016**

• Led multidisciplinary teams in high-stakes operational and investigative environments, integrating strategic planning with real-time decision-making to deliver actionable insights and outcomes.

• Managed complex projects under pressure, coordinating technical teams, prioritizing objectives, and ensuring timely, data-driven execution in fast-paced, high-responsibility settings.

• Applied advanced analytical skills to assess chemical, biological, and physical evidence, translating complex scientific data into clear, decision-support outputs for stakeholders.

• Conducted structured risk assessments and upheld operational safety standards, ensuring reliability, compliance, and team performance under evolving conditions.

• Authored comprehensive technical reports and collaborated with cross-functional partners to solve complex challenges, improve workflows, and deliver results with high integrity.

• Demonstrated resilience, adaptability, and leadership in unpredictable situations, fostering trust, accountability, and consistent execution in regulated environments.

Education

Bachelor of sciences, The Technion-Israel	**2011 – 2012**
Ph.D. Biochemistry and Biophysics, The Technion-Israel	**2017 – 2022**

Awards and Recognitions

1. First award by Millipore Sigma for public interest, Nucleate's program final event, USA, 2025.
2. 13th HOPE Meeting with Nobel Laureates On behalf of Japan Society for the Promotion of Science (JSPS), nationally selected by the Ministry of Science and Technology of Israel with 5 other participants, 2022.
3. Russell Berrie Nanotechnology Institute (RBNI) scholarship for excellence in Nanoscience & Nanotechnology, 2021.
4. Faculty award for excellence, Department of Biology, The Technion, 2020.
5. EIT food innovation competition (captain of group of 4 student), first place award, international competition, 2020.
6. Lev Margulis Memorial Prize from the Israel Society for Microscopy (ISM), 2020.
7. Daniel Turnberg Fellowship (Cambridge University, UK), 2019.
8. The Prof. Rahamimoff Travel Grants for Young Scientists (UCLA, USA), 2017.
9. Second place award, BioTech Innovations for Obesity Trends competition, Israel, 2012.

Conferences

Lectures

2021 Annual meeting of Israel Society of Biochemistry and Molecular Biology (ISBMB), The Weizmann Institute, Rehovot, Israel.
2021 Material Science & Nanotechnology, Hybrid - virtual Meeting, Lisbon, Portugal
2021 Invited speaker as Lev Margulis prize awardee of 2020, The Israel Society for Microscopy (ISM) Meeting - virtual meeting, Israel
2021 EMBL department seminar- virtual meeting, Hamburg, Germany
2021 POLYMERS, PLASTICS AND COMPOSITES, Hybrid - virtual Meeting, Budapest, Hungary
2019 The Israel Society for Microscopy (ISM) Meeting, Israel
2019 The Israel Crystallographic Association and Structural Biology (ICA), Israel

Poster presentation

2022 13th HOPE Meeting On behalf of Japan Society for the Promotion of Science (JSPS), virtual meeting, Japan.
2021 Annual meeting of Israel Society of Biochemistry and Molecular Biology (ISBMB), The Weizmann Institute, Rehovot, Israel

2021 The 2021 International Nanotechnology Conference in Israel.
2021 EMBO- Designing functional biomolecular assemblies: Beyond biology, virtual meeting.
2020 4th Ulm meeting "Biophysics of Amyloid Formation", Ulm, Germany
2019 Cooperation in Photon Science: Israel - DESY & European XFEL Workshop, Israel Academy of Sciences and Humanities, Jerusalem, Israel.
2019 The Israel Society for Microscopy (ISM), Israel
2019 The Israel Crystallographic Association and Structural Biology (ICA), Israel
2019 The fourth Instruct Biennial Structural Biology Conference, Alcalá de Henares, Spain.
2019 3rd Ulm meeting " Biophysics of Amyloid Formation", Ulm, Germany.
2018 2nd Ulm meeting "Biophysics of Amyloid Formation", Ulm, Germany.

Outreach Activities

2020 YNET and Jerusalem Post, "Technion students win international competition in Europe".
2020 Radio interview, "Three who know", Kan Tarbot
2020 Technion magazine, "Researchers at The Technion determined the atomic structure of an important antibiotic fibril in the human immune system".
2020 YNET and Rotter Health "The atomic structure of important peptide's fibril was determined".
2020 Big New Network article, "Israeli researchers decipher structure of vital component in immune system".
2018 Apprenticeship at the research group of Dr. Tamir Gonen, University of California, Los Angeles (UCLA), USA. Using electron diffraction of cryogenic electron micrographs to determine atomic structure in high resolution of nanometric crystals formed by self-assembled peptides.