MIT Industrial Liaison Program Faculty Knowledgebase Report

2025 MIT Seoul Symposium

January 20, 2025 1:00 pm - 6:00 pm

All dates/times listed below are Korea Standard Time (GMT +9).
The agenda below is subject to change without prior notice.

1:00 PM

Registration and Check-in

1:30 PM

Welcome Remarks

Suehyun Chung
Head of LG Sciencepark
Chairman of LG Group Technology Council

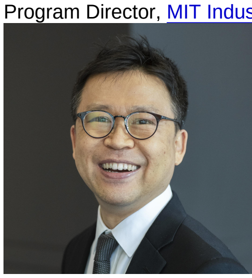
1:45 PM

Welcome Remarks from the Government

Sunhak Cho
Director-General, Science and Technology Policy Bureau
Ministry of Science and ICT, The Republic of Korea

1:55 PM

MIT Innovation Ecosystem
Taegyun Moon
Program Director, MIT Industrial Liasion Program



Taegyun Moon
Program Director
MIT Industrial Liasion Program

Dr. Taegyun Moon joined Corporation Relations in October 2021 as Program Director. Moon will be working in the Life Science group.

Dr. Moon left his current position as Chief Strategy Officer at Aspen Imaging Healthcare in Plano, TX. In his role at Aspen, he has led new business development and, among other accomplishments, launched a new product through his partnership with Samsung. With some authorized overlap with Aspen, Moon also led strategy and business development for NeuroNexus Technologies (a University of Michigan spinoff) in Ann Arbor. Before that, he spent more than five years with Samsung Economic Research institute in Seoul as a Principal Research Analyst focusing on medical devices, pharma, and the digital health industries. Other positions held include Consultant at Boston Consulting Group (Seoul), Associate at McKinsey & Company (Seoul), CEO Jingfugong Food Inc. (Qingdao, China), and Research Assistant in the Neural Engineering Lab at the University of Michigan.

Moon earned his B.S. and M.S. both in Mechanical Engineering at the Korea University in Seoul, and his Ph.D., Biomedical Engineering at the University of Michigan in Ann Arbor. He speaks Korean (native) and Chinese in addition to English.

2:10 PM

99% Air: Nano-Engineering the Materials of the Future

Carlos M. Portela
Robert N. Noyce Career Development Assistant Professor
MIT Department of Mechanical Engineering

Architected materials—i.e., materials whose three-dimensional (3D) micro- or nanostructure has been engineered to attain a specific purpose—are ubiquitous in nature and have enabled properties that are unachievable by all other existing materials. Their concept relies on maximizing performance while requiring a minimal amount of material. Several human-made 3D architected materials have been reported to enable novel mechanical properties such as high stiffness-to-weight ratios or extreme resilience, especially when nanoscale features present. However, most architected materials have relied on advanced additive manufacturing techniques that are not yet scalable and yield small sample sizes. Additionally, most of these nano- and micro-architected materials have only been studied in controlled laboratory conditions, while our understanding of their performance in real-world applications requires attention.

In this talk, we will explain the concept of architected materials, providing various examples that we routinely fabricate and test in our laboratory at MIT, and we will discuss how nanoscale features significantly enhance their performance. We will also discuss ongoing research directions that will not only allow us to scale-up their fabrication, but also understand how they perform in realistic conditions outside the laboratory—towards contributing to more efficient material solutions in industry and beyond.

3:10 PM

Networking Break

3:30 PM

Optical Neural Networks and Computing with Light

Ryan Hamerly
MIT Quantum Photonics & AI Group

The rise of LLMs and generative AI has caused a dramatic increase in the energy consumption of data centers, a problem that will continue to grow as AI becomes more ubiquitous. Our group studies the use of photonics as an enabler for next-generation AI accelerators that can be orders of magnitude faster and more efficient than electronic processors, leveraging the bandwidth, latency, and low-loss interconnection advantages of optically encoded signals. I will discuss our work addressing the main challenges of photonic computing, including (i) scalability, where we are developing time-multiplexed and free-space optical systems to overcome area bottlenecks, (ii) noise and imperfections, where we have developed new hardware error correction algorithms for photonics, (iii) the use of delocalized computing to overcome von Neumann bottlenecks (with additional applications in quantum-secure computation), and (iv) training, where we have demonstrated a forward-only training algorithm for photonic neural networks.

4:30 PM

Innovating Materials and Chemistry for a Decarbonized Future

Iwnetim Abate
Chipman Career Development Professor, Assistant Professor of Materials Science and Engineering
MIT Department of Materials Science and Engineering

Decarbonizing transportation, the grid, and heavy industries depends on the success of both short- and long-duration energy storage solutions. Through novel material design and chemistry, my lab addresses critical challenges in developing affordable, sustainable, and reliable energy storage technologies. For short (to medium)-duration storage, we design and develop new cathode materials for sodium-ion batteries rich in manganese and iron. Our goal is to achieve energy densities comparable to lithium-ion batteries but at lower costs, without relying on critical minerals, thereby accelerating the transition to more sustainable energy storage. For long-duration storage, we have developed groundbreaking pathways for producing hydrogen (H?) and ammonia (NH?) using subsurface chemistry. By harnessing redox reactions on Fe-rich rocks and utilizing the Earth's natural heat and pressure, we demonstrate the potential for stimulated geological H? and NH? production. These methods achieve near-zero CO? emissions while remaining cost-competitive with existing technologies. Our work integrates advanced materials design with sustainable chemistry to provide scalable, impactful solutions for a decarbonized future.

5:30 PM

Closing Remarks

5:35 PM	Networking Reception