2023 MIT Korea Conference

April 28, 2023 9:30 am - 6:00 pm

9:00 AM	Registration and Breakfast
9:30 AM	Welcome and Opening Remarks

9:45 AM

The MIT Ecosystem and MIT ILP
Jewan Bae
Director, MIT Corporate Relations

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Jewan John Bae comes to MIT Corporate Relations with more than 20 years of experience in the specialty chemicals and construction industries. He facilitates fruitful relationships between MIT and the industry, engaging with executive level managers to understand their business challenges and match them with resources within the MIT innovation ecosystem to help meet their business objectives.

Bae's areas of expertise include new product commercialization stage gate process, portfolio management & resource planning, and strategic planning. He has held various business leadership positions at W.R. Grace & Co., the manufacturer of high-performance specialty chemicals and materials, including Director of Strategic Planning & Process, Director of Sales in the Americas, and Global Strategic Marketing Director. Bae is a recipient of the US Army Commendation Medal in 1986.

Taegyun Moon
Program Director, MIT Industrial Liasion Program

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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.

10:00 AM

AI-Empowered Discovery of Novel Antibiotics
James Collins

Termeer Professor, Institute for Medical Engineering & Science (IMES) at MIT
Professor, MIT Department of Biological Engineering
Professor, Wyss Institute at Harvard
Professor, Broad Institute of MIT and Harvard

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James Collins is the Termeer Professor of Medical Engineering & Science and professor of biological engineering at MIT, as well as a Member of the Harvard-MIT Health Sciences & Technology Faculty. He is also a core founding faculty member of the Wyss Institute for Biologically Inspired Engineering at Harvard University, and an institute member of the Broad Institute of MIT and Harvard. Collins is one of the founders of the field of synthetic biology, and his patented technologies have been licensed by over 25 biotech, pharma, and medical devices companies. He has helped to launch a number of companies, including Synlogic (NASDAQ: SYBX), EnBiotix, Sample6 Technologies, and Senti Biosciences, and has received numerous awards and honors, including a Rhodes Scholarship, a MacArthur "Genius" Award, an NIH Director's Pioneer Award, the Sanofi - Institut Pasteur Award, as well as several teaching awards. Collins is an elected member of all three national academies - the National Academy of Sciences, the National Academy of Engineering, and the National Academy of Medicine - as well as the American Academy of Arts & Sciences, the National Academy of Inventors, and the World Academy of Sciences.

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In this talk, we highlight the Antibiotics-AI Project, which is a multi-disciplinary, innovative research program that is leveraging MIT's world-leading strengths in artificial intelligence, bioengineering, and the life sciences to discover and design novel classes of antibiotics. The Antibiotics-AI Project is focused on developing, integrating, and implementing deep learning models, and chemogenomic screening approaches: (1) to predict novel antibiotics from expansive chemical libraries (1.5 billion molecules) with diverse properties, (2) to design de novo novel antibiotics based on learned structural and functional properties of existing and newly discovered antibiotics, and (3) to identify, using white-box machine learning models, the molecular mechanisms underlying the newly discovered and/or designed antibiotics. These deep-learning approaches will utilize multi-scale computation to embrace and harness the complexity of biology and chemistry to discover, design and develop new classes of antibiotics, up through preclinical studies. The platform has been designed so that it can be utilized and applied in a rapid fashion to emerging and re-emerging bacterial pathogens, including multidrug-resistant (MDR) bacteria and extensively drug-resistant (XDR) bacteria.

10:45 AM

Networking Break

11:00 AM	MIT Startup Exchange Lightning Talks

Rick Pierce
Co-founder and CEO
Decoy Therapeutics

Karl Ruping
Founder and CEO
Tiba Biotech

Ashish Kulkarni
Chairman and CEO
Kebotix

Bayan Takizawa
Co-founder and Chief Business Officer
CONTINUUS Pharmaceuticals

Benjamin Williams
Co-founder and VP of Corporate Development
4M Therapeutics

Lavi Erisson
Co-founder and CEO
Gensaic

Ho-Jun Suk
Co-founder and CEO
DXLab

Laura Crowell
Director of R&D
Sunflower Therapeutics

Ivan Cenci
General Manager
Empatica

12:00 PM	Lunch with Startup Exhibit

1:15 PM

Enhancing Chemical Discovery and Development with AI, Automation, and Flow Chemistry

Klavs Jensen
Warren K. Lewis Professor, Department of Chemical Engineering at MIT
Professor, MIT Materials Science and Engineering

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MIT Materials Science and Engineering

Klavs F. Jensen is the Warren K. Lewis Professor in Chemical Engineering and Materials Science and Engineering at the Massachusetts Institute of Technology. He is a co-director of MIT's consortium, Machine Learning for Pharmaceutical Discovery and Synthesis, which aims to bring machine learning technology into pharmaceutical discovery and development. From 2007- July 2015, he was the Head of the Department of Chemical Engineering. His research spans thermal-, electro-, and photo-chemistry in batch and flow, kinetics and optimization, automation, and machine learning to develop new methods that accelerate chemical discovery and development. His lab explores new automated reaction systems integrated with online analytics, robotics, optimization, and machine learning algorithms toward autonomous discovery.

Prof. Jensen is the co-author of ~500 refereed journal publications and the inventor of 63 US patents. He is the inaugural Editor-in-Chief of the Royal Society of Chemistry Journal Reaction Chemistry and Engineering. Prof. Jensen is a member of the US National Academy of Sciences, the US National Academy of Engineering, and the American Academy of Arts and Science. He is a Fellow of the American Association for the Advancement of Science (AAAS), the National Academy of Inventors, the American Institute of Chemical Engineers, and the Royal Society of Chemistry.

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Case studies highlight methods for molecular discovery and development of small molecule pharmaceuticals, starting with multistep continuous organic synthesis (flow chemistry) in modular units for pharmacy on-demand applications. Integration of computer computer-aided synthesis planning (CASP), automation, robotics, and process analytic tools enables automatic synthesis planning and execution on a modular platform configured by a robot. The platform's modularity, robotic reconfigurability, and flexibility for synthesis are demonstrated with CASP-proposed and human-refined multistep syntheses of exemplary small molecule pharmaceuticals, including an optimization case study of yield and throughput. The final example demonstrates molecular discovery with a robotic 96-well chemical platform performing closed-loop, autonomous chemical discovery by combining generative machine learning models, property prediction, CASP-guided automatic synthesis, and automatic isolation and characterization in an overall feedback loop.

2:00 PM — Industry Plenary Talks: MIT Spin-off Companies

Behzad Mahdavi
SVP, Biopharma Manufacturing & Life Sciences Tools
Ginkgo Bioworks

New therapeutic modalities built on complex biologics are arriving to the clinic and the market faster than ever. While safe and efficient, these new modalities sometimes lack scalability, making them hard to produce at the costs and rates which would make them truly accessible. In this talk, we describe how you can use the Ginkgo platform to leverage the power of synthetic biology at scale to simultaneously optimize your discovery and manufacturability.

Sang Eun Jee
Application Scientist
XtalPi

AI can cut down the development timeline and cost for drug discovery by answering two significant questions: What molecules should be made next? And how are the lead molecules modified? This talk will address XtalPi's AI drug discovery technology and integrated platform, and how they solved challenging problems with AI.

2:45 PM — Networking Break

3:00 PM — Molecular Technologies for the Discovery, Delivery, and Manufacturing of Small Molecules, Proteins, and Oligonucleotides
Bradley L. Pentelute
Professor, MIT Department of Chemistry

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MIT Department of Chemistry

Brad Pentelute, Professor in the Department of Chemistry, modifies naturally occurring proteins to enhance their therapeutic properties for human medicine, focusing on the use of cysteine arylation to generate abiotic macromolecular proteins, the precision delivery of biomolecules into cells, and the development of fast flow platforms to rapidly produce polypeptides.

Pentelute earned a B.S. in chemistry and a BA in psychology at the University of Southern California, followed by a Ph.D. in organic chemistry at the University of Chicago. After a postdoc fellowship at Harvard Medical School, Pentelute joined the MIT faculty in 2011. His awards and honors include an Alfred P. Sloan Research Fellowship, a Novartis Early Career Award, and an Amgen Young Investigator Award.

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Here I will overview our recent efforts in developing the use of affinity-selection mass-spectrometry to rapidly discover high-affinity peptide ligands to protein targets and how we adapted the platform for small molecule drug development via a peptide-based information system. Many targets we work with are manufactured with a protein printer technology that now produces milligrams of folded functional variants in hours. Last, I will discuss our efforts in using deep learning to deliver antisense oligonucleotides into cells.

3:45 PM — Closing Remarks

3:50 PM — Networking Reception