

# MIT Industrial Liaison Program Faculty Knowledgebase Report

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## Emerging Technology, Resilient Business

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November 6, 2020 9:00 am - 12:00  
pm

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8:30am - 9:00am

Registration

9:00am - 9:10am

Remarks by ZGC Leader

9:10am - 9:15am

Remarks by CJ Guo  
CJ (Changjie) Guo  
Program Director, [MIT Corporate Relations](#)



CJ (Changjie) Guo  
Program Director  
[MIT Corporate Relations](#)

Dr. CJ Guo joined the Office of Corporate Relations as a Senior Industrial Liaison Officer in July, 2015. CJ comes to OCR with 25 years of extensive global experience in technology innovations, portfolio management and business development in emerging and conventional energy sectors with leading multinational corporations in the US, China and Canada.

CJ is a leading expert in emerging energy technologies and energy system transitions. With Shell, he was the Emerging Technology Theme Leader in China/Beijing (2011 to 2015), worked extensively with the Chinese energy communities on the country's future energy landscape, and the Senior Technology Advisor in alternative transportation fuels in the US / Houston (2006-2010), and served during 2010 as Chairman of the Fuel Operations Group for the US DOE FreedomCar Partnership. Prior to joining Shell, CJ has held technology development, commercialization and management positions with Air Liquide (2002-2006) and The BOC Group (1995-2001) after working as a research scientist in oil-sands upgrading with CANMET in Canada (1992-1994).

CJ earned his Ph.D., Chemical Engineering, at CSU, Ohio, his M.S. and B.S., Chemical Engineering at TYUT, China. He has earned various awards from Shell, Air Liquide, BOC, Shanxi Province (China). He holds many patents and has sat on the board of Shenzhen Sanmu Battery Technology Company as an independent board member during 2009-2010.

9:15am – 9:25am

Introduction of MIT Industrial Liaison Program  
Karl Koster  
Executive Director, MIT Corporate Relations  
Director, Alliance Management  
MIT Office of Strategic Alliances & Technology Transfer



Karl Koster  
Executive Director, MIT Corporate Relations  
Director, Alliance Management  
MIT Office of Strategic Alliances & Technology Transfer

Karl Koster is the Executive Director of MIT Corporate Relations. MIT Corporate Relations includes the MIT Industrial Liaison Program and MIT Startup Exchange.

In that capacity, Koster and his staff work with the leadership of MIT and senior corporate executives to design and implement strategies for fostering corporate partnerships with the Institute. Koster and his team have also worked to identify and design a number of major international programs for MIT, which have been characterized by the establishment of strong, programmatic linkages among universities, industry, and governments. Most recently these efforts have been extended to engage the surrounding innovation ecosystem, including its vibrant startup and small company community, into MIT's global corporate and university networks.

Koster is also the Director of Alliance Management in the Office of Strategic Alliances and Technology Transfer (OSATT). OSATT was launched in Fall 2019 as part of a plan to reinvent MIT's research administration infrastructure. OSATT develops agreements that facilitate MIT projects, programs and consortia with industrial, nonprofit, and international sponsors, partners and collaborators.

He is past chairman of the University-Industry Demonstration Partnership (UIDP), an organization that seeks to enhance the value of collaborative partnerships between universities and corporations.

He graduated from Brown University with a BA in geology and economics, and received an MS from MIT Sloan School of Management. Prior to returning to MIT, Koster worked as a management consultant in Europe, Latin America, and the United States on projects for private and public sector organizations.

#### Keynote Presentations

9:25am - 9:45am

Advanced Heat Spreaders for Flexible and High-Power Electronics

Ronggui Yang  
Professor in the School of Energy and Power Engineering at Huazhong University of Science and Technology

9:45am - 10:15am

## The Belt and Road to a Green Future

Alex Slocum

Director, Precision Engineering Research Group (PERG)

Walter M. May (1939) and A. Hazel May Chair in Emerging Technologies, [MIT Department of Mechanical Engineering](#)



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[MIT Department of Mechanical Engineering](#)

Alexander Slocum is the Walter and Hazel May Professor of Mechanical Engineering at MIT and a member of the US National Academy of Engineering. He has 130+ patents and has helped develop 12 products that have received R&D 100 awards for "one of the one hundred best new technical products of the year". He has helped start several successful precision manufacturing equipment companies and has a passion for working with industry to solve real problems and identify fundamental research topics. For the past decade his prime focus has been on renewable energy systems.

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This presentation will provide an introduction to key new technologies for production of a green future. As the world emerges from the Coronavirus (COVID-19) pandemic and seeks to rebuild its economy, if a resurgence in demand for energy is met by hydrocarbons, an accelerated climate change crisis will dwarf the damage caused by COVID-19; a massive opportunity to stop global warming will be lost. Distributed production and trade with good logistics and connections between countries are critical and can be improved with the Belt and Road Initiative (BRI) and a commitment to creating a green future. As the network for transporting goods and services between peoples is made ever better, factories can be set up at nodes along the network on land and sea for the good of all.

10:15am - 10:25am

Coffee Break

10:25am - 10:45am

Multiscale and Multifunctional Manufacturing at Digital Age  
Nicholas Fang

Professor of Mechanical Engineering  
MIT Department of Mechanical Engineering

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Professor of Mechanical Engineering  
MIT Department of Mechanical Engineering

Nicholas X. Fang received his BS and MS in physics from Nanjing University, and his PhD in mechanical engineering from University of California Los Angeles. He is currently professor of Mechanical Engineering at MIT. Prior to MIT, he worked as an assistant professor at the University of Illinois Urbana-Champaign from 2004 to 2010. Professor Fang's areas of research look at nanophotonics and nanofabrication. His recognitions include the ASME Chao and Trigger Young Manufacturing Engineer Award (2013); the ICO prize from the International Commission of Optics (2011); an invited participant of the Frontiers of Engineering Conference by National Academies in 2010; the NSF CAREER Award (2009) and MIT *Technology Review Magazine's* 35 Young Innovators Award (2008).

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Advanced manufacturing has become the powerhouse that trigger innovation of intelligent, flexible, customer-oriented product development and new business models in the industrial ecosystem worldwide. According to the 2019 report of World Economic Forum, manufacturing industries account for 64% of global R&D spending. In the meantime, the rapid emergence of ecological constraints calls for integrated functional products and manufacturing solutions that meet the critical societal challenges such as energy efficiency, carbon emission, worker safety, and environmental regulations at large scale. The scientific breakthroughs of data and interconnectivity driven manufacturing may lead to a paradigm shift of meta-manufacturing, that is, design and processing multifunctional elements at unprecedented precision and heterogeneity.

These multifunctional elements can be exemplified by the emerging architected metamaterials with integrated functions that are desirable for a broad array of applications in confined spaces, including impact absorption, thermal management and chemical processing, optical transparency, structural morphing, as well as real time monitoring and repair. The control of spatial arrangements with functional printable materials determines the mass transport and energy transfer within architected microreactors, which are significant for many emerging applications, including use in catalytic, biological, battery, or photochemical reactors. In this talk we shall review the state-of-the-art of research in the development of some of the most advanced digital manufactured functional microreactors. We then the outline major challenges in the field and provide our perspectives on future research and development directions.

10:45am - 11:15am

Panel discussion on industry-academia collaboration and innovation

- Zhongcheng Gao (Chairman of Z-Link)
- Wei Luo, (CEO, ZGC International Holding Co., )
- Ronggui Yang, (Professor of Huazhong Univ. of Science & Technology)
- CJ Guo (Program Director, ILP, MIT)

**Energy and sustainability**

- [Syzygy](#): Illuminating the future of the hydrogen industry
- [Sweetwater Energy](#): Cost-effective, environmentally friendly biomaterials & biochemicals
- [Kebotix](#): Advanced materials and chemicals invented with analytics and robotics
- [Equota Energy](#): Smart Systems for Energy Management

**Robotics & Digital**

- [Akasha Imaging](#): Computer Vision for robotic assembly & safety
- [BlockTEST](#): Optimizing blockchain solutions to enhance the flow of materials, data, and finance
- [Catalia Health](#): Social robot for managing diseases including Covid-19
- [CareAcross](#): Digital health coach for cancer patients

Rebecca Xiong

Program Director, MIT Startup Exchange

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Dr. Rebecca Xiong joined Corporate Relations as Program Director, Startup Exchange in October 2018.

Dr. Xiong comes to Corporate Relations with more than 15 years of experience in the MIT Startup Ecosystem, having co-founded and worked at multiple MIT startups. Most recently, as Co-founder and Chief Scientist at SocMetrics, she leads product management, data science, and machine learning for SocMetric's personalization and marketing campaign products. Before SocMetrics, Xiong co-founded Going.com. Going.com connected people via local events to enhance their offline social life, and through Rebecca's leadership grew to 1M members, tens of millions of monthly pageviews, and finally its acquisition by AOL. Before these two entrepreneurial endeavors, Xiong held positions as Product Marketing Manager (DataPower, acquired by IBM), Senior Program Manager (Performaworks, acquired by Workscape), and Team Lead (Akamai Technologies). She also has research experience at Microsoft, Silicon Graphics, and Xerox Palo Alto Research Center.

Dr. Xiong earned her B.S. in Computer Science at the University of California at Berkeley, and her Ph.D. in Computer Science at the Media Lab at MIT with her thesis "Visualizing Information Spaces to Enhance Social Interaction." She was a National Science Foundation (NSF) Fellowship Recipient. She holds multiple patents and is very involved in the community, as the Lead Organizer of the Cambridge Parent Summit.

[Trevor Best](#)  
CEO, [Syzygy Plasmonics](#)



Trevor Best  
CEO  
[Syzygy Plasmonics](#)

Mr. Best is the founding CEO of Syzygy Plasmonics. Before starting Syzygy, he worked for Baker Hughes. There he steadily progressed into management, where he gained expertise in quality assurance (Six Sigma Black Belt), regulatory compliance, technology development management, project and personnel management, supply chain management, internal/external communications, and business process architecture. With Syzygy he has successfully raised two funding rounds and is currently focusing on bringing this revolutionary photochemical technology to market.

[Jack Baron](#)  
President & Cofounder, [Sweetwater Energy](#)



12:25pm - 2:00pm

Lunch Break

2:00pm - 2:20pm

Companion Robot to Inspire Imagination and Curiosity

Feng Tan  
CEO, Woobo Inc, MIT Alum

2:20pm - 2:40pm

Forces of Change in the Digital Age  
Kamal Youcef-Toumi

Professor of Mechanical Engineering  
Co-Director, Center for Clean Water and Clean Energy  
MIT Department of Mechanical Engineering

Kamal Youcef-Toumi

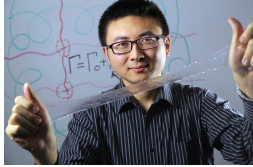
Professor of Mechanical Engineering  
Co-Director, Center for Clean Water and Clean Energy  
MIT Department of Mechanical Engineering

Kamal Youcef-Toumi joined the MIT Mechanical Engineering Department faculty in 1985. He earned his advanced degrees (M.S. 1981 and Sc.D. 1985) in Mechanical Engineering from MIT. His undergraduate degree (B.S. in Mechanical Engineering awarded in 1979) is from the University of Cincinnati. Professor Youcef-Toumi's research has focused primarily on design, modeling, simulation, instrumentation, and control theory. The applications have included manufacturing, robotics, automation, metrology and nano/biotechnology. He teaches courses in the fields of dynamic systems; robotics; precision machine design and automatic control systems. Professor Youcef-Toumi was selected as a National Science Foundation Presidential Young Investigator "in recognition of research and teaching accomplishments and academic potential." He served as a member on several professional committees of The National Science Foundation, Chairman of the Information Technology program within The Arab Science and Technology Foundation, Member of the review committee for European Union funded Network of Excellence for Innovative Production Machines and Systems, Member of the Scientific Committee for Qatar Foundation Annual Research Forum, Head of the Controls, Instrumentation and Robotics Area in the Mechanical Engineering Department at MIT, Member of the MIT Council for International Programs, and Research and Strategy Advisor for Qatar Computing Research Institute. He is the Co-Director of the Center for Clean Water and Clean Energy and Co-Director of the Center for Complex Engineering Systems at MIT. Professor Youcef-Toumi has served as a consultant for a several companies including AT&T Bell Laboratories, EDO Corporation, Varian Radiation Division, Gillette Corp., Delta Search Laboratories, Jentek Sensors, Morgan Stanley Co., General Electric, TEKES - National Technology Agency of Finland, Jordan Hospital, Mitsubishi Electric Corp. Penn State University-College of Medicine - Cancer Institute, and Saudi Aramco. He is a member of IEEE and an ASME Fellow. He served as Chairman of the ASME Dynamics Systems & Control Division Robotics Panel. He was an Associate Editor of the ASME Journal of Dynamic Systems Measurement and Controls, the International Program Committee Chairman for the 2010 IFAC Symposium on Mechatronic Systems, and an Associate editor of the ASME's Dynamic Systems and Control Division (DSCD) Conference Editorial Board. He has served as Editor of several symposia/conference proceedings. Professor Youcef-Toumi is the author of over 320 publications, including a textbook on the theory and practice of direct-drive robots. He holds over 48 registered/pending patents. Professor Youcef-Toumi has been an invited lecturer at over 180 seminars at companies, research centers and universities throughout the world.

In 2018 alone, the digital transformation spending was more than \$1trillion. Industries that adopted digital technologies and IR4.0 concepts prospered. Their important benefits include enhanced competitiveness and better positioning in the global value chain. These are due to a greater operational effectiveness, cost reduction, superior flexibility and automation in production, improved worker safety, along with digital services and business management. Modern organizations that embraced such digital transformation are forward-thinking, adapt to diverse business environments, innovate in technology and beyond, refine the art of collaboration, and adjust to the changing generation of workers, talent and customers. The presentation will cover some industry practices along with some results illustrating advancements in computing, intelligent robotic systems, and machine intelligence.

2:40pm - 3:00pm

Advances in Soft Materials Technology  
Xuanhe Zhao  
Professor, [MIT Department of Mechanical Engineering](#)



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Professor  
[MIT Department of Mechanical Engineering](#)

Xuanhe Zhao is a Professor of Mechanical Engineering at MIT. The mission of Zhao Lab is to advance science and technology between humans and machines to address grand societal challenges in health and sustainability. A major current focus is the study and development of soft materials and systems. Dr. Zhao has won early career awards from NSF, ONR, ASME, SES, AVS, Adhesion Society, JAM, EML, and Materials Today. He has been a Clarivate Highly Cited Researcher since 2018. Bioadhesive ultrasound, based on Zhao Lab's work published in Science, was named one of TIME Magazine's Best Inventions of the year in 2022. SanaHeal Inc., based on Zhao Lab's work published in Nature, was awarded the 2023 Nature Spinoff Prize. Over ten patents from Zhao Lab have been licensed by companies and have contributed to FDA-approved and widely-used medical devices.

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Whereas human tissues and organs are mostly soft, wet and bioactive; machines are commonly hard, dry and biologically inert. Merging humans, machines and their intelligence is of imminent importance in addressing grand societal challenges in health, sustainability, security, education and joy of living. However, interfacing humans and machines is extremely challenging due to their fundamentally contradictory properties. At MIT Zhao Lab, we exploit soft materials technology to form long-term, high-efficacy, multi-modal interfaces and convergence between humans and machines.

In this talk, I will first discuss the mechanics and general principles to design extreme properties including tough, resilient, adhesive, strong, fatigue-resistant and conductive for soft materials. Then I will discuss a set of soft materials technology platforms, including i). bio adhesives for instant strong adhesion of diverse wet dynamic tissues and machines; ii). bio electronics for long-term multi-modal neural interfaces; iii). Bio robots for teleoperated and autonomous navigations and operations in previously inaccessible lesions such as in cerebral and coronary arteries. I will conclude the talk with a perspective on future human-machine convergence enabled by soft materials technology.

3:00pm - 3:10pm

Tea Break

3:10pm - 3:30pm

The New (Ab)Normal  
Yossi Sheffi  
Elisha Gray II Professor of Engineering Systems  
Director, [MIT Center for Transportation and Logistics](#)



Yossi Sheffi  
Elisha Gray II Professor of Engineering Systems  
Director  
[MIT Center for Transportation and Logistics](#)

Yossi Sheffi is an expert in systems optimization, risk analysis and supply chain management. He is author of a text book and seven award-winning management books. His latest books are: "The New Abnormal: Reshaping Business and Supply Chain Strategy Beyond Covid-19," (October 1, 2020) and "A Shot in the Arm: How Science, Technology and Supply Chains Converged to Vaccinate the World (October 2021).

Under his leadership, MIT CTL has launched many educational, research, and industry/government outreach programs, including the MIT SCALE network involving six academic centers round the world. In 2015, CTL has launched the on-line Micromaster's program, enrolling over 480,000 students in 196 countries.

Outside the institute, Dr. Sheffi has consulted with numerous organizations. He has also founded or co-founded five successful companies, all acquired later by large enterprises.

Dr. Sheffi has been [recognized](#) in numerous ways in academic and industry forums and won dozens of awards.

He obtained his B.Sc from the Technion in Israel in 1975, and SM and Ph.D. from MIT in 1978.

For more information visit: <http://sheffi.mit.edu/>

[View full bio](#)

In October 1 Professor Sheffi's new book: *The New (Ab)Normal: Reshaping Business and Supply Chain Strategy Beyond Covid-19* was published on Amazon. In the book he maps how the Covid-19 pandemic impacted business, supply chains, and society. The book exposes the critical role supply chains play in helping people, governments, and companies to manage the crisis. Sheffi draws on executive interviews, pandemic media coverage, and historical analyses. Professor Sheffi also builds on themes from his previous books on risk and resilience: *The Resilient Enterprise (2005)* and *The Power of Resilience (2015)* to enrich the narrative. The book paints a picture of how the Covid-19 virus is changing many facets of human life and what our post-pandemic world might look like. The intent is that this book will help companies to redefine their business models and adjust to a fast-evolving economic landscape.

3:30pm - 4:00pm

Startup and investment session with MIT alumni in China

Chaired by Dr. **Xiang Kai** (Technology Strategist, ByteDance, PhD, Material Sciences, MIT, 2017)

- **Chengtao Li**, Founder/CEO, **Galixir**; PhD, Computer Science, MIT, 2019.
- **Feng Tan**, Co-Founder **Woobo Inc.** PhD, MeChE, MIT, 2015.
- **Hang Chen**, Co-founder / CEO, **neoX Biotech**, PhD, Chemistry, MIT, 2016.
- **Kecheng Wei**, Co-Founder/CEO, **Neural Galaxy**, MS, MIT, 1999.

4:10pm

Concluding Remarks