

# MIT Industrial Liaison Program Faculty Knowledgebase Report

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## Innovation at the Food-Logistics-Materials Nexus

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November 9, 2023 10:00 am - 12:00  
pm

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10:00 AM

Welcome & Introduction

John Roberts

Executive Director (Interim), [MIT Corporate Relations](#)



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Executive Director (Interim)

[MIT Corporate Relations](#)

John Roberts has been Executive Director of MIT Corporate Relations (Interim) since February 2022. He obtained his Ph.D. in organic chemistry at MIT and returned to the university after a 20-year career in the pharmaceutical industry, joining the MIT Industrial Liaison Program (ILP) in 2013. Prior to his return, John worked at small, medium, and large companies, holding positions that allowed him to exploit his passions in synthetic chemistry, project leadership, and alliance management while growing his responsibilities for managing others, ultimately as a department head. As a program director at MIT, John built a portfolio of ILP member companies, mostly in the pharmaceutical industry and headquartered in Japan, connecting them to engagement opportunities in the MIT community. Soon after returning to MIT, John began to lead a group of program directors with a combined portfolio of 60-80 global companies. In his current role, John oversees MIT Corporate Relations which houses ILP and MIT Startup Exchange.

10:05 AM

## Biomaterials for Boosting Food Security and Materials Circularity

Benedetto Marelli  
Associate Professor  
[MIT Civil and Environmental Engineering](#)

Food production is responsible for 26% of global greenhouse gas (GHG) emissions, and more than 25% of municipal solid waste comes from food and its packaging, which is often non-recyclable. Furthermore, unpredictable climate events, a projected population of 10 billion people by 2050, and limited resource access will strain the agri-food systems' resilience. Food waste further aggravates food insecurity; more than 700million people are undernourished, whereas more than 30% of the total food produced, which could potentially feed 1.26 billion people, is never eaten, generating 6% of global GHG emissions and wasting 25% of global freshwater consumption.

As new technologies that are economically sustainable, scalable, and rapidly deployable to market are needed to address these challenges, an opportunity lies for biomaterials to lead innovation in the agri-food industry. Our laboratory strives to reinvent biopolymers as advanced materials for boosting food security.

In this webinar, we highlight recent developments in the nanomanufacturing of biopolymers to design:

- (i) Physical unclonable functions for food traceability.
- (ii) Packaging that are biodegradable yet possess good membrane proprieties, sense spoilage, and mitigate biotic decay.
- (iii) Microenvironments that boost seed germination in marginal land. These examples will provide an opportunity to discuss how the design of biomaterials for applications in food and agriculture leverages merits of non-toxicity and biodegradation to address challenges in procurement, synthesis at scale, and manufacturing by retrofitting existing techniques.

10:45 AM

## Analytic Tools to Improve Sustainability of Global Wood Supply Chains--video starts at time stamp 44.06

Saurabh Amin  
Professor  
[MIT Civil and Environmental Engineering](#)

A major challenge in ensuring that wood remains a sustainable construction material is our poor understanding of where, how much, and what type of wood is harvested and where it goes in the global trade of wood products. Many enforcement agencies lack effective tools to identify illegally harvested and traded timber despite new laws, satellites, and other monitoring technologies. As a result, uncontrolled deforestation continues to thrive and resulting carbon emissions are difficult to quantify and map. We adopt a systems-based approach to monitor the rates of harvest and conduct strategic inspection to detect illegally harvested or traded timber in the global supply chain. Our work builds on advances in machine learning, remote sensing, network modeling, and game theory.

In this webinar, we will discuss progress in supply chain network analysis to identify the flow of illegal timber throughout the global supply chain and strategic inspection to estimate the effectiveness of incentives and interventions in combatting illegal deforestation.

11:15 AM

## Automated Design of Low-Carbon Structures for Conventional and New Construction Materials--video starts at time stamp 124.04

Josephine Carstensen  
Assistant Professor  
[MIT Civil and Environmental Engineering](#)

As in other sectors, industrial material use and its processing is a major source of carbon and greenhouse gas emissions in the building and construction industry. Recommended strategies to reduce these carbon emissions include using more environmentally friendly materials and/or less material through optimizing the structural design.

Automated design exploration can be powerful for exploring new sustainable low-carbon design solutions for both conventional and new structural materials. For designs in operation to perform as predicted, the automated design framework must capture the material behavior and any design limitations induced by the planned construction or manufacturing method.

Using the construction industry as an example, this talk will discuss the possibilities and implementation of automating the design of sustainable structures.

11:55 PM

Summary and Closing

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12:00 PM

Adjournment