

*Weldon School of Biomedical Engineering
Special Seminar*

Monday, May 23, 2022

9:30 – 10:30am

MJIS 1001 or Via Zoom:

<https://purdue-edu.zoom.us/j/93205657134?pwd=MIBIRFFtSzIPUDFDdTgvOGViU1Z1Zz09>

“Pollen-Based Materials Innovation for Sustainable Technologies”



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Abstract: Throughout history, new materials have been the foundation of disruptive technologies. From bronze, paper, and ceramics to steel, polymers, and semiconductors, each material enabled far-reaching advances and defined the era. Seventy years ago, the synthesis of pure semiconductors as single crystals led to a complete transformation of the electronics industry and sweeping changes in communications, computing, and transportation. Today, inspired by the United Nation’s Sustainable Development Goals (SDGs) – a blueprint to achieve a better and more sustainable future for all – another new class of materials is emerging—one with both the potential to alleviate environmental burden, provide radically new functions, and to challenge our notion of what constitutes a “material.” These materials, inspired and co-opted from biology, combine (1) hybrid-composite design, combining disparate building blocks; (2) compartmentalized architecture, encapsulating desirable biomolecules while excluding others; and (3) hierarchical organization. Together, they enable unique and remarkable combinations of properties, including adaptability, plasticity, multi-functionality, and environmental responsiveness – far beyond those achieved by monolithic materials of the synthetic world. An extraordinary example is pollen, a discrete mesoscale compartment, which encapsulates, protects, and transports male genetic material in flowering plants enabling the biological imperative of reproduction. In this talk, I will introduce our ongoing efforts to explore the materials science of pollen and to transform pollen into a valuable commodity to produce pollen-based materials innovation as a sustainable solution to numerous outstanding environmental challenges. Key examples that will be covered include digital printing of shape-morphing materials, recyclable and reusable paper, and oil-absorbing sponges.

Bio: Nam-Joon Cho is the MRS-Chair Professor in the School of Materials Science and Engineering at Nanyang Technological University in Singapore. His research activities focus on biomaterial engineering approaches to solve important biomedical and environmental problems and to translate these capabilities into practical applications for global health and sustainability. His research team has published over 270 scientific papers in top journals such as Nature Materials, Nature Medicine, Nature Communications, Nature Protocols, Science Translational Medicine, Science Advances, Advanced Materials, ACS Nano, and the Journal of the American Chemical Society. Dr. Cho’s scientific work has been highlighted by international media organizations such as Reuters, CNBC, and Businessweek, and has led to licensed technologies in the fields of antiviral medicine, biomaterials, and biotechnology. He is a graduate of Stanford University and the University of California, Berkeley. s