The National Academies of
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Chemical Engineering in the 21st Century: Challenges and Opportunities
February 24, 2021
11:00 am – 2:00 pm ET

Join Link:
https://nasem.zoom.us/j/92469681112?pwd=ZEN1ajlYMnBFWlUvSkxNSFBKWnJYQT09

Open Session Agenda

11:00 AM **Welcome and Meeting Overview**
Eric Kaler, Committee Chair

11:05 AM **Future of Biomaterials and Opportunities for Chemical Engineering**
Dr. Kristi Anseth
University of Colorado, Boulder

12:05 PM **Chemical Engineering Contributions to Sustainability**
Dr. George Stephanopoulos
Arizona State University, Global KAITEKI Center

1:05 PM **Adjourn Open Session**

Closed Session (1:05 – 2:00 pm)

Kristi Anseth (NAS, NAE, NAM) and her research group pioneer the development of biomaterials to serve as synthetic extracellular matrix (ECM) analogs that capture key features of the biochemical and biophysical aspects of a cell's niche – an environment that is not only tissue specific, but can be strikingly heterogeneous and dynamic. Unique to her approach is the ability to create cell-laden matrices in three-dimensional space in which the matrix properties can be changed on demand – so-called 4D biology. Ultimately, Dr. Anseth and her group seek to understand how cells sense, store, and exchange information with the ECM and then use this knowledge to engineer biomaterial niches as cell delivery vehicles for tissue regeneration, in vitro models of disease, and physiologically-relevant models for drug discovery and screening. Her materials-first approach provides tools to perform unique cell biology experiments and address major hurdles in regenerative medicine. Anseth's recent progress includes innovations in both photochemical and bio-click reactions to manipulate biomaterial properties in space and time, along with lithographic processes and confocal microscopy to perform these reactions in real time and in cell-laden matrices. She pursues application of these bioscaffolds to: (i) elucidate how specific extracellular signals influence stem cell differentiation with applications in musculoskeletal tissue regeneration, (ii) direct symmetry breaking events in organoids and develop high throughput arrays for drug screening, and (iii) understand the fibroblast-to-myofibroblast transition in cardiac fibrosis, with an emphasis on the role of mechanotransduction.

George Stephanopoulos (NAE) joined Arizona State University in January 2018 and holds a joint appointment as professor at the School of Molecular Sciences and the School for Engineering of Matter, Transport and Energy. He is also the Arthur D. Little Post-Tenure Professor of Chemical Engineering at the Massachusetts Institute of Technology. His research and teaching interests have covered many aspects of process systems engineering, such as: process synthesis; process modeling and analysis; process optimization; process operations modeling, analysis, diagnosis, and control; process operations scheduling and planning. His systems engineering interests led him into a variety of other types of systems, addressing research issues related to the design, analysis, control, optimization of the corresponding systems: networks of chemical or biochemical reactions; integrated manufacturing systems within the scope of a national economy or corporate business; city traffic networks and intercity transportation networks; systems approaches to the design and manufacturing of products; and process systems engineering for integrated nanoscale processes.He received his diploma in chemical engineering from National Technical University of Athens in 1970, and his ME from McMaster University in 1971. During 1971-74, he worked with Art Westerberg at the University of Florida on his doctorate. He then joined the University of Minnesota as an assistant professor of chemical engineering. He was promoted to associate professor in 1977 and professor in 1981. In September of 1980, he took on a chaired professorship at his Greek alma matta and taught there until January 1984, when he joined the faculty at MIT; first as the J. R. Mares and then as the A. D. Little Professor of Chemical Engineering. During 2000-02, he took a leave of absence from MIT and was appointed chief technology officer and managing executive officer of Mitsubishi Chemical Corporation (MCC). Upon his return to MIT, he continued as managing director, member of the Board of MCC until 2005.