



Dr. Michael Tsapatis

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Department of Chemical and Biomolecular Engineering
Johns Hopkins University

April 29, 2025
1:30pm - 3:00pm
OMU Frontier Room

Metal-Organic Thin Films for Membranes and Microelectronics

Metal-organic frameworks (MOFs) hold promise as gas separation membranes due to their tunable permeation properties enabled by the structural diversity stemming from the plethora of available metal/organic linker combinations. Although relatively rapid progress for highly selective MOF membranes has been achieved, reliable and scalable thin film processing remains a challenge. In this talk, I will discuss synthesis and post-synthesis modification methods we have been developing based on vapor phase processing and use of electron-beam-, X-ray- and plasma-induced modifications. These methods establish a new materials processing paradigm with potential uses beyond thin film separation membranes. A new potential application of crystalline and amorphous MOF films for electron beam lithography and extreme ultraviolet lithography, used in the fabrication of microelectronic devices, will also be presented.

Michael Tsapatis is a Bloomberg Distinguished Professor at Johns Hopkins University (JHU). Before joining JHU (September 1, 2018) he was on the faculty of the Department of Chemical Engineering and Materials Science at the University of Minnesota since September 2003 where he held the Amundson Chair and the McKnight Presidential Endowed Chair. Before joining the University of Minnesota, he was a faculty member in the Chemical Engineering Department at the University of Massachusetts Amherst (1994-2003). He received an Engineering Diploma (1988) from The University of Patras, Greece, and MS (1991) and Ph.D. (1994) degrees from the California Institute of Technology (Caltech) working with G.R. Gavalas. He was a post-doctoral fellow with M.E. Davis (1993/94).

His research group's accomplishments include development of hierarchical mesoporous zeolite catalysts, oriented molecular sieve films, molecular sieve/polymer nanocomposites for membrane applications, crystal structure determination of adsorbents that are now used in a commercial process, and synthesis of precisely sized oxide nanoparticles that have been commercialized. For his contributions to zeolite synthesis, he has received the Alpha Chi Sigma Award for Chemical Engineering Research from AIChE, the Breck Award from the International Zeolite Association, and in 2015 was elected to the National Academy of Engineering. He has supervised/co-supervised to completion the Ph.D. thesis of ~50 graduate students and advised ~40 former postdoctoral fellows who now work in the chemical and microelectronics industries, in national laboratories, and in academia.



HARRY G. FAIR

Each year, a special lecture is given in memory of Harry G Fair, an outstanding OU alumnus.

Fair was born in Okmulgee, Oklahoma, on June 3, 1916, and earned his bachelor of science degree in chemical engineering in 1939. He joined Phillips Petroleum Company in 1939 and worked his way up to vice president for supply and transportation, with responsibility for worldwide exchange of crude oil and all transportation facilities. In 1966, Fair joined M.W. Kellogg Co. as executive vice president in charge of all engineering activities. He was named executive vice president of Coastal States Gas Corporation in 1971, a post he held until his death on July 27, 1974. A member of a number of professional societies and a licensed professional engineer, Fair was active in service to society and his alma mater.

This lecture is made possible by the Harry G. Fair Memorial Fund established by his widow, Jane Swift Fair. Arrangements for the lecture are made by the School of Chemical, Biological and Materials Engineering in the OU Gallogly College of Engineering.

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