29b Experimental and Theoretical Aspects of Catalytic Membrane Reactors

Theodore T. Tsotsis

Catalytic membrane reactors combine reaction and membrane-based separations in the same process unit. Membrane reactor-based processes belong to the broader class of reactive separation technologies, which also encompass other processes like reactive distillation, sorption and crystallization. In this talk we will first review the current status of the field and the technical challenges that catalytic membrane reactor-based processes still face before they attain broad commercial appeal. We will then describe some of our recent activities in the area. In the past, the emphasis in our work had been on the enhancement of yield and selectivity. We have come to realize in recent years, however, that the separation component is often equally critical or even more important in determining overall process economics. This has been the driver for our current activities in the area of membrane development and characterization. An area of recent interest to our group is the use of membranes in power generation applications. We will review in our talk two aspects of our work: the implications of the use of membranes on the combustion process itself, and the development of novel membrane systems appropriate for such applications.