**Department of Chemical**

**Engineering Seminar Schedule**

**Supercritical Pyrolysis of Fuels for Future High-Speed Aircraft: Mechanisms of PAH Growth**

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**Abstract**

In order to meet aircraft-cooling requirements in future high-speed aircraft, fuels will be expected to sustain temperatures and pressures of up to 700 °C and 130 atm in the fuel lines and injection system, where residence times may be on the order of minutes. Such conditions, supercritical for most hydrocarbons, will cause the fuel to undergo pyrolytic reactions, which can lead to polycyclic aromatic hydrocarbons (PAH), precursors to carbonaceous fuel-line deposits, a problem of critical importance to avoid, for safe aircraft operation. Solids formation has proven to be particularly problematic for alkane fuels.

In order to investigate the mechanisms of PAH formation and growth in the supercritical alkane pyrolysis environment, we have performed supercritical pyrolysis experiments in an isothermal, isobaric flow reactor, with the model fuel *n*-decane (344.5 °C; critical pressure, 20.7 atm)—to which, in some experiments, certain dopants have been added. The experiments are conducted at temperatures up to 600 °C and pressures up to 100 atm, and the pyrolysis products are analyzed by gas chromatography and high-pressure liquid chromatography. The identification of the reaction products—along with the quantified effects, on product yields, of the added dopants—reveals the important roles of alkenes, arylmethyl radicals, and phenalenyl-type radicals in the reactions of PAH growth in the supercritical alkane-fuel pyrolysis environment.

**Bio**

Wornat graduated summa cum laude with a bachelor’s degree in chemical engineering from Rensselaer Polytechnic Institute in 1981, then pursued her graduate studies at the Massachusetts Institute of Technology, where she performed research in the general area of fuels and combustion and earned her Master of Science and Doctor of Science degrees in chemical engineering in 1983 and 1988, respectively. Wornat has held various positions, including working two years as a research scientist at the Commonwealth Scientific and Industrial Research Organization, Division of Coal and Energy Technology, in Sydney, Australia, and two years as a senior member of technical staff at Sandia National Laboratories, Combustion Research Facility, in Livermore, Calif. Wornat was recently named the dean of the LSU College of Engineering.

**Seminar**

**Friday, September 22**

**Livermore 101**

**3:00 pm**