

The Remarkable Chemistry of Precursor Soot

Peter T. A. Reilly, William B. Whitten, and J. Michael Ramsey
Oak Ridge National Laboratory
P.O. Box 2008
Oak Ridge, TN 37831-6142

Precursor soot is a high temperature stable (> 700 °C) hydrocarbon with many surprising physical and chemical properties. As the name implies, it is the chemical precursor of mature soot and is formed as a liquid droplet in flames and other forms of pyrolysis. When analyzed by standard techniques after extraction from the pyrolysis environment, precursor soot is found to be an oily mixture of a variety of chemically unattached polycyclic aromatic hydrocarbons (PAHs). Strangely, the boiling points of the PAHs found to comprise the majority of the oil are well below the temperature where the precursor soot is formed. This presents an apparent paradox and gives a hint as to strange chemistry that must be occurring for this material to exist. Here we will present hard evidence of the chemistry of precursor soot and reveal its potential as a synthetic medium.

"The submitted manuscript has been authored by a contractor of the U.S. Government under contract No. DE-AC05-00OR22725. Accordingly, the U.S. Government retains a nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or allow others to do so, for U.S. Government purposes."

Research sponsored by Office of Research and Development, U.S. Department of Energy, under contract DE-AC05-00OR22725 with Oak Ridge National Laboratory, managed and operated by UT-Battelle, LLC.