conferenceseries.com

Nathan S Jacobson, J Chromatogr Sep Tech 2018, Volume 9
DOI: 10.4172/2157-7064-C1-039

7th World Congress on

Mass Spectrometry

June 20-22, 2018 | Rome, Italy

Nathan S Jacobson

NASA Glenn Research Center, USA

Mass spectrometric sampling of high temperature inorganic vapors

Mass spectrometry has long been applied to study inorganic vapors at high temperatures. Such measurements lead to a variety of useful information including thermochemical data on the both the vapor itself and condensed phase vapor source, identity of the vapor species above a particular condensed phase, and bond energies of the vapor species. However, sampling of high temperature vapors presents a series of unique challenges. Paricular care must be taken to have a clear, unobstructed path to the ionizer. In this paper, we describe the sampling system used at NASA Glenn and also a recently developed Monte Carlo simulation of this sampling system. The vapor source is a Knudsen cell, heated to temperatures up to 2000°C. An orifice in the cell of well-defined geometry forms a molecular beam, which is directed through a series of aperatures into the mass spectrometer ionizer. Following the method of Chatillon and colleagues, the first aperture has a smaller diameter than the Knudsen cell orifice so that the ionizer effectively 'sees' only into the cell, thus minimizing the effects of background gases. A second aperature further directs the molecular beam into the ionizing region. This molecular beam portion of this process can be modeled with a simple Monte Carlo simulation. Trajectories begin in the Knudsen cell and are traced through, till either the molecule leaves the sampling region or reaches the ionizer. This code allows optimization of aperature diameters and spacings as well as estimation of the efficiency of the sampling process. Future ideas are presented for high sensitivity measurements of inorganic vapors.

Biography

Nathan S Jacobson completed his PhD at the University of California, Berkeley and Post-doctoral studies at the University of Pennsylvania, Philadelphia. He has been a Research Scientist at NASA Glenn Research Center in Cleveland, OH for his entire career, studying high temperature chemical reactions as related to aero engines and spacecraft. He has published extensively on high temperature gas/solid reactions, vaporization processes, and chemical thermodynamics in *Journal of Materials Science* and has served as an Editorial Board Member of the *Journal of the American Ceramic Society*.

nathan.s.jacobson@nasa.gov

Notes: