

UDEI/CMET Seminar

February 20, 2014

2:00 p.m.

366 Colburn Lab

Dr. John M. Shaw

NSERC Industrial Research Chair in Petroleum Thermodynamics

Department of Chemical & Materials Engineering

University of Alberta, Edmonton, Canada



John Shaw obtained his B.A.Sc. degree in Chemical Engineering and his Ph.D. in Metallurgy and Material Science at the University of British Columbia, Vancouver, Canada, in 1981 and 1985 respectively. In 1985, he joined the Department of Chemical Engineering and Applied Chemistry at the University of Toronto, where he rose to the rank of professor. In 2001, he joined the Department of Chemical and Materials Engineering at the University of Alberta where he holds the NSERC industrial research chair in petroleum thermodynamics.

During his career he has developed expertise in the phase behavior, physiochemical and transport properties of hydrocarbon mixtures from coal liquids, heavy oils and condensate rich reservoir fluids to pure compounds. He has held visiting scientist/professor positions at the Technical University of Delft (Delft, The Netherlands), the Institut Francais du Petrole (Rueil-Malmaison, France), the Syncrude Canada Research Centre (Edmonton, Canada), the ITESM campus of the Technical University of Monterrey (Guadalajara, Mexico), UPPA (Pau, France)

and the TOTAL Research Centre (Pau, France).

In his current role he develops enabling technologies, and methodologies for measuring and calculating thermophysical properties of hydrocarbons, and for selecting industrial processes related to the hydrocarbon production, transport and refining sectors.

Redefining Heavy Oil Characterization: A Dissident's Perspective

High boiling point and non-distillable hydrocarbon fractions include ill-defined molecular constituents and nano-aggregated organic materials. These materials are found naturally in crude oils and reservoir fluids and are important to understand because they pose challenging problems during production, transport and refining. Our collective understanding of these materials, based on dissonance in the research literature on their sub-molecular, molecular, supramolecular and bulk properties is clearly rudimentary. This lack of coherence is reviewed in light of a growing body of evidence that the connection between the physics and chemistry attributed to these petroleum fractions and their measurable properties is tenuous at best. Recent experimental and theoretical results from SAXS measurements, to Far-IR measurements, from quantum mechanical calculations to solution chemistry, and from phase diagrams to rheometry, support this contention and explain the high failure rates of predictive models for their behavior across all length scales. Collective action is needed to escape this characterization dead end and to move the literature to appropriate and quantitative descriptions of crude oils and reservoir fluids?