Dr. Michael L. Hobbs

Mike received his BS, MS, and PhD in Chemical Engineering from Brigham Young University. He worked for Shell Oil Co. from 1985 to 1987 and subsequently joined Sandia National Laboratories in 1990. His work has involved numerical simulation of the physics related to fossil fuel energy conversion, polymer decomposition, propellants, explosives, and pyrotechnics.

Mike was the first to describe polymer decomposition using percolation theory applied to Bethe lattices. Mike created a large thermodynamic database that includes heat capacity and EOS parameters (intermolecular potential coefficients) for 900 gases and 500 condensed species. This database is used to accurately predict detonation and expansion states for many different explosives.

More recently, Mike developed a universal cookoff model (UCM) that is coupled to a micromechanics pressurization (MMP) model that accurately predicts thermal ignition in a wide variety of energetic materials ranging from powerful conventional explosives (e.g., CL-20) to nitric acid-soaked kitty litter which is the subject of the plenary lecture.

The UCM uses distributed activation energies that cause reaction rates to decelerate to mimic diffusion reactions or accelerate to mimic autocatalytic reactions. The MMP model includes volumetric thermal strain and internal pressurization using analytical solutions of elastic equations. The MMP model incorporates displacement of the condensed phase giving unprecedented predictive capability, especially for high density polymer bonded explosives.

Mike has published 50 journal articles (38 as first author), 90 conference proceedings (44 as first author), and numerous reports. Mike's articles are featured on 4 journal covers in Propellants, Explosives, and Pyrotechnics.