

Development of a Custom High-Temperature, High-Pressure Phase Behavior Apparatus

Aaron Rowane^{1, S, C}

¹*NIST, Boulder, CO, U.S.A.*

aaron.rowane@nist.gov

In this presentation, the design of a custom apparatus to measure the phase behavior and density of highly asymmetric mixtures to pressures of 240 MPa and temperatures of 673 K is presented. The instrument consists of a variable-volume view cell and camera to monitor the phase behavior and an LVDT coupled with a metal bellows to track the internal volume of the view cell. Both the view cell and thermostat were designed using finite element analysis to ensure the operability of the instrument to high pressures and that stable temperature control could be achieved at high temperatures. Additionally, image analysis tools were used to accomplish automated data acquisition of bubble points, liquid-liquid phase separation, and solidification phase behavior. Preliminary measurements are presented to demonstrate the operation of the instrument.