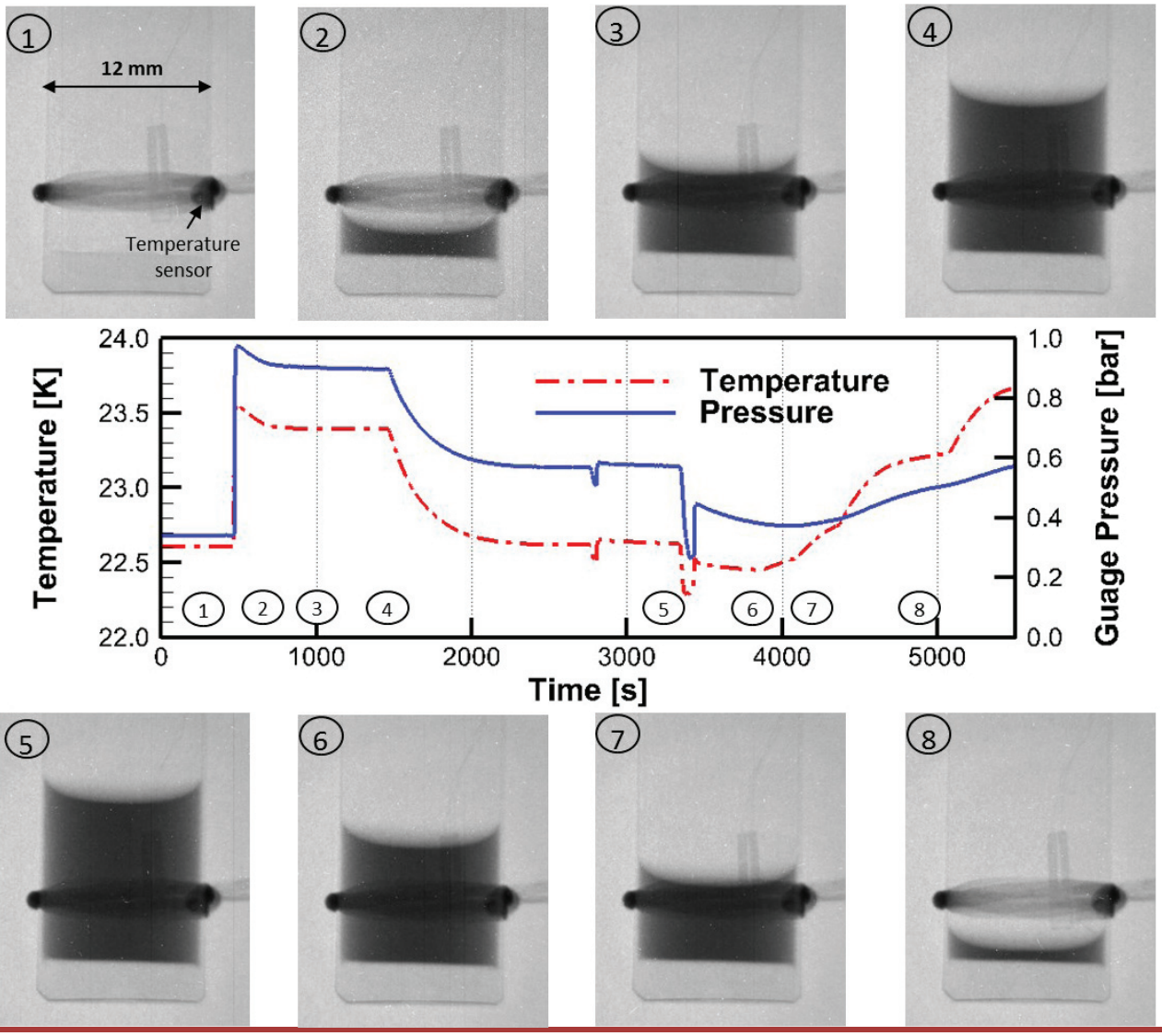

Neutron Radiography of Condensation and Evaporation of Hydrogen in a Cryogenic Condition

Kishan Bellur, Ezequiel Medici, Jeffrey Allen, & Chang Kyoung Choi, Michigan Technological University, Houghton, MI 49931
Jimes Hermanson & Arun Tamilarasan, University of Washington, Seattle, WA 98195
Daniel Hussey, David Jacobson, & Juscelino B. Leao, National Institute of Standards and Technology, Gaithersburg, MD 20899
John McQuillen, NASA Glenn Research Center at Lewis Field, Cleveland, OH 44135

The condensation and evaporation of hydrogen under cryogenic conditions is visualized by using neutron imaging at the BT-2 Beam Facility at the National Institute of Standards and Technology (NIST). The condensation and evaporation are controlled by adjusting temperature (20 K ~ 23 K) and pressure (1.3 ~ 1.95 bar absolute). The hydrogen contained in the aluminum test cell inside the cryostat has a large attenuation coefficient due to its large scattering cross section. The high sensitivity of neutron radiography to hydrogen allows the visualization of a meniscus and a contact line of evaporating hydrogenated cryogenic propellants. The graphic represents the temperature, pressure and corresponding images of liquid hydrogen in the test cell. The test cell is made of Aluminum 6061 with an inner diameter of 12 mm. The captured images are then median filtered and post-processed in order to find the volume of liquid hydrogen in the test cell as a function of time. The condensation/evaporation rates obtained from neutron imaging along with corresponding temperature and pressure are used to validate the evaporation model being developed by the authors.

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