

**Viscosity Measurement of CO<sub>2</sub> -in -Water Foam with Nonionic Siloxane Surfactant**

Ria Ayu Pramudita,<sup>1,\*</sup>  
;<sup>1</sup>  
(wsryoo@hongik.ac.kr<sup>\*</sup>)

Emulsions and foams of CO<sub>2</sub> and water are of high interest in various fields, including enhanced oil recovery, drug delivery systems, and microelectronics fabrication. High -pressure CO<sub>2</sub> may also be utilized as non -toxic alternative to harmful volatile organic solvents. A set of high -pressure apparatus for generating CO<sub>2</sub> -in -water foam was utilized to measure the viscosity of the CO<sub>2</sub> -in -water foam in a range of experimental conditions from 35 to 55 °C up to the pressure of 3,500 psi. The effects of temperature, pressure, as well as capillary shear stress were analyzed for water -soluble surfactant that contains functional groups of trisiloxane as CO<sub>2</sub> -phile. Aqueous 2 wt.% surfactant solutions were mixed with the equal weight of CO<sub>2</sub> to form 50:50 emulsions in the high -pressure apparatus. The apparent viscosity was calculated from the pressure drop measured in various lengths of capillary tubes by using Hagen -Poiseuille equation. The viscosity was measured as high as a few tens of centipoise when the surfactant was effective in forming stable foam. From observations of apparent viscosities with varying shear rate, the CO<sub>2</sub> -in -water emulsions exhibited shear -thinning behaviors.