

Case ID:M14-066P

Published: 12/1/2014

Inventors

Konrad Rykaczewski

Contact

Shen Yan
shen.yan@skysonginnovations.
com

Condensation Based Contact Angle Goniometer

Contact angle goniometers measure the angle between the edge of a liquid droplet and the (liquid or solid) surface it's on in order to analyze relevant properties of the liquid and surface. The device consists of a pipette fastened over an adjustable 3-axis sample stage, whose backlit image is captured and processed by a super speed digital camera connected to a computer. Typically, goniometers operate under standard conditions (room temperature, etc.). However, under nonstandard conditions small quantities of liquid become increasingly difficult to manipulate, significantly complicating contact angle measurement. Currently, the only goniometers with nonstandard capabilities require elaborate liquid dispensing systems in order to accommodate micro and nanoliter volumes at high pressures. These goniometers are expensive, lack controlled fluid delivery, and can only handle a limited amount pressure and temperature.

Researchers at ASU have invented a contact angle goniometer capable of controlling micro and nanoliter volumes under acute nonstandard conditions. The invention is unlike anything on the market, and accomplishes this by localized preferential condensation. A tiny, thermal-conducting metal tip is encapsulated within a thermal insulator with only a sub-millimeter portion of the tip exposed. The condensation assembly is mounted over an adjustable 3-axis sample stage within a high pressure vessel equipped with optical windows for viewing, and the temperature of the goniometer tip and sample stage is controlled using nitrogen gas to balance resistive heating and cooling. This invention provides a simple yet cost effective alternative to pipette based goniometers and facilitates contact angle studies at previously unattainable pressures and temperatures.

Potential Applications

- Condensation Studies
- Detergent, Insecticide, and Printer Ink Development
- Microfluidics
- Petroleum Refining
- Physical Vapor Deposition (PVD) Processing
- Polymer, Plastic, and Textile Coatings
- Refrigerants
- Semiconductor Fabrication

Benefits and Advantages

- Inexpensive – Cost effective alternative to high pressure pipette goniometers.
- Innovative – Enables contact angle studies at previously unattainable pressures and temperatures.
- Precise – Greater control over droplet formation.

For more information about the inventor(s) and their research, please see

[Dr. Konrad Rykaczewski's directory webpage](#)