

Inertial Spreading and Imbibition of a Liquid Drop Through a Porous Surface

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Primary CNF Tools Used: Goniometer and the availability of other wonderful tools at CNF

Summary of Research:

The project that has been accomplished in Cornell NanoScale Science and Technology Facility (CNF) is a part of the ISS imbibition project with NASA. The ISS project requires capillary plates with hydrophilic coatings.

To get a hydrophilic surface, the capillary plates need to be coated with SAM coating. For feasible and strength purposes, the capillary plates must be made of metal. The plate must first be coated with a thin layer of gold after the metal plate has been machined to the required roughness. Because SAM is stable on gold but rarely on other metals, gold plating must first be applied.

All the gold coated plates were then coated with self-assembled-monolayer (SAM) coatings in Professor Susan Daniel's Lab (<https://chemistry.cornell.edu/susan-daniel>).

Thiols 6-Mercapto-1-Hexanol, 6-Mercaptohexanoic Acid 90% and 8-Mercaptooctanoic Acid 95% were used. The contact angles were measured in CNF's Rame 500 Goniometer to record the resulting contact angles and their hysteresis. Corresponding hydrophilic angles of 26°, 46°, and 68° were obtained for 6-Mercapto-1-Hexanol, 6-Mercaptohexanoic Acid 90% and 8-Mercaptooctanoic Acid 95% respectively.

