

NANO HOUR

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Nanohour is a student organized interdisciplinary seminar series designed to enhance the graduate student experience at Boise State University.

Dr. Matthew Dixon, Biolin Scientific

Wettability and Adhesion of Real Surfaces

Quantification and optimization of wettability and interfacial tension is beneficial for a wide swath of applications including paints and adhesion coatings; inks and pigments; oil and gas recovery; specialty chemical development; biomaterial compatibility; emulsion characterization; and surface treatment and cleanability evaluation. With over 25 years of experience, Biolin Scientific produces precision force and optical tensiometers for academia, industry R&D and QC, and government laboratories, and they have been used in thousands of publications by top universities and companies.

To ensure good wettability, a basic requirement is that the surface tension (ST) of the liquid should be less than or equal to the surface free energy (SFE) of the solid surface. Surfactants and other additives can be added to the liquid to reduce the ST, or coatings and treatments can be applied to the surface to increase the SFE. Contact angle measurements are used to measure the SFE and SFE components (e.g., polar, dispersive). Performance criteria such as friction, adhesion, and cleanliness have been correlated to SFE or SFE components. However, SFE analysis assumes ideal conditions that are not always maintained for real applications (e.g., smoothness, chemical homogeneity).

Thus, methods to measure surface heterogeneity and to correct for surface roughness effects have been developed for optical and force tensiometry. The theory behind ideal and real interfacial behavior is introduced, and practices for characterizing ideal and real surfaces are discussed. Finally, example case studies are included to show these principles in action to improve and discriminate between product performance



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Inspired by the Nanohour seminar from the Beckman Institute at the University of Illinois at Urbana-Champaign, this seminar series provides an opportunity to introduce a wide range of topics to a diverse and interdisciplinary audience. From policy, business, science, and engineering, our aim is to stimulate discussions surrounding the emerging applications of nanotechnology in addressing grand challenges we face as a society.

NanoHour: Taking seminars to a whole new scale