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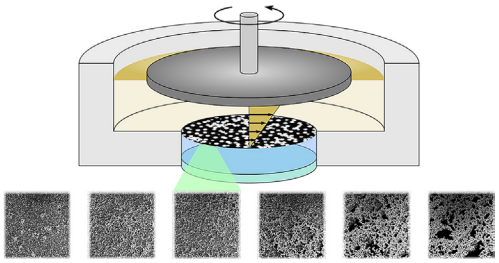
Approach allows for measurements of lower interfacial viscosities than have previously been reported in double-wall ring geometry.



Interfacial rheology provides some of the necessary tools for understanding phenomena such as foam stability. Most of today's technologies, however, rely on probes directly attached to interfaces. This limits sensitivity by significantly disturbing the structure of the interface itself.

Muntz et al. developed a contactless interfacial method for performing interfacial rheology on liquid/liquid interfaces. By shearing one of the liquid phases and measuring the interfacial response with confocal microscopy, the approach can measure steady shear material parameters without tools attached directly to the interface. Such work opens the door for measuring lower interfacial viscosities than have previously been reported in double-wall ring geometry.

"This work allows measuring the mechanical properties of liquid-liquid interfaces without attaching a macroscopic probe to the interface itself, thereby preventing disturbance of the interface that is being measured," said author Job Thijssen. "Interestingly, this may better mimic the application of large interfacial area systems in some situations. For example, when applying skin cream, the interface of the dispersed phase is indirectly deformed by application of shear to the continuous phase."

Simultaneously conducting macroscopic rheological analysis and microscopic structural analysis provided the researchers a means for directly visualizing the interfacial response to particle surface coverage and interfacial assembly. Taking the work further, they were able to capture the irreversible changes in how particles assemble in response to steady shear.

"Even though we use a rheometer and a confocal microscope, in principle our contactless technique should work with a fixed-rate motor and a reflection or fluorescence microscope," Thijssen said.

The group looks to further investigate the mechanical properties of oil-water interfaces, including in situations relevant to everyday applications.

Source: "Contactless interfacial rheology: Probing shear at liquid-liquid interfaces without an interfacial geometry via fluorescence microscopy," by Iain Muntz, James A. Richards, Sam Brown, Andrew B. Schofield, Marcel Rey, and Job H. J. Thijssen, *Journal of Rheology* (2022). The article can be accessed at https://doi.org/10.1122/8.0000559.