There are particles in my whiskey: Studying colloids and interfaces in bourbon whiskey

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Abstract:
Bourbon whiskey itself is a chemically complex liquid containing thousands of constituents that define its flavor profile, yet these aromatic compounds make up less than 1% (by weight) of whiskey's composition. A significant portion of these compounds are water insoluble and micelles will from when whiskey is diluted. The presence of these colloids is well-known in the spirits industry and they are monitored for product quality control. Recently, we have used dynamic light scattering (DLS) to quantify their size and concentration. In addition, these colloids will form a chemical monolayer at the liquid-air interface during evaporation. We observed this phenomenon when these monolayers collapsed and created a vibrant pattern of self-assembled microstructures we have termed "whiskey webs". Assembly is a function of the inherent properties of the whiskey as well as the extrinsic evaporation characteristics. Initially, we demonstrated that these structures only formed for American whiskey; however, our recent work using microfabricated pedestals enables the study of other monolayers. This presentation will highlight our research studying whiskey colloidal properties as well as provide a technical overview of facets relevant to the whiskey industry. Through this work, our goal is to communicate colloid and interface science to the general public, more information is found at whiskeywebs.org.

Biography:
Dr. Stuart J. Williams is an Associate Professor in the Department of Mechanical Engineering at the University of Louisville. His lab studies various aspects of microfluidics with an emphasis on impedance spectroscopy, colloid characterization, and field-based manipulation of micro- and nanoparticles. Under the support of the NSF Graduate Research Fellowship Program, Dr. Williams' Ph.D. (Purdue University, '09) used a combination of optical and electrical fields to dynamically pattern and trap microparticles. Current work in his lab includes building an electrokinetic microfluidic platform for studies on the ISS (NASA EPSCoR), designing an intraoperative device to measure bone density (NIH), creating specialized conductive nanofibers for enhanced filtration (NSF CMMI), and characterizing the dielectric properties of proteins and nanoparticles (NSF DBI). His lab website is microfluidics.louisville.edu.

***This seminar counts towards the ME 600 seminar requirement for Mechanical Engineering graduate students.**
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