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Visualizing Floating Cereal Patterns to Understand Nanotechnology Processes

San Diego, Calif., Nov. 16 – Small floating objects change the dynamics of the surface they are on. This is an effect every serious student of breakfast has seen as rafts of floating cereal o's arrange and rearrange themselves into patterns on the milk. Now scientists have suggested that this process may offer insight into nanoscale engineering processes.

"Small objects floating on the fluid-air interface deform the surface and attract each other through capillary interactions, a phenomenon dubbed `The Cheerios Effect,'" explains student Khoi Nguyen. "Interesting motions occur here caused by attractive and repelling forces and torques. Studying how the shape of the objects influences this motion helps us understand colloidal self-assembly."

Nguyen, along with graduate student Michael Miller and their advisor Shreyas Mandre, Ph.D., study "The Cheerios Effect" and will present some early findings at the meeting of the American Physical Society's (APS) Division of Fluid Dynamics (DFD), held Nov. 18 - 20 in San Diego,Calif.

Colloidal self-assembly is a process in which nanoscale materials – technology built to a scale of 1-100 millionths of a meter – organize by themselves into crystalline structures. These structures can be used to efficiently and cost-effectively make many things, from pharmaceuticals to telecommunications.

The forces causing self-assembly originate from the curvature of the meniscus around objects. Meniscus means "crescent" in Greek and refers to the curve in the top surface of a liquid cause by surface tension around a floating object. This curvature, and the ensuing motion, is controlled by the shape of the object.

To visualize particle motion related to the meniscus, the team cut various acrylic shapes with a laser, floated them in a Petri dish, filmed the interactions and observed. "Our goal is to optimize the force fields around objects floating on a surface, and understanding meniscus dynamics may be one way to do that," explains Miller.

Presentation: "Fluid Surface Deformation by Objects in the Cheerios Effect," is at 5:50 p.m. on Sunday, Nov. 18, in the Ballroom 20D foyer.
Abstract: http://meeting.aps.org/Meeting/DFD12/Event/177627

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MORE MEETING INFORMATION
The 65th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics will take place from November 18-20, 2012, in San Diego, Calif. It will bring together researchers from across the globe to address some of the most important questions in modern astronomy, engineering, alternative energy, biology, and medicine. All meeting information, including directions to the Convention Center, is at: http://apsdfd2012.ucsd.edu/

USEFUL LINKS
Main Meeting Web Site: http://apsdfd2012.ucsd.edu/
Searchable Abstracts: http://meeting.aps.org/Meeting/DFD12/APS_epitome
Directions and Maps: http://apsdfd2012.ucsd.edu/?page=Venue_and_Maps

PRESS REGISTRATION
Credentialed full-time journalists and professional freelance journalists working on assignment for major publications or media outlets are invited to attend the conference free of charge. If you are a reporter and would like to attend, please contact Charles Blue (dfdmedia@aps.org, 301-209-3091).

SUPPORT DESK FOR REPORTERS
A media-support desk will be available. Press announcements and other news will be available in the Virtual Press Room (see below).

VIRTUAL PRESS ROOM
The APS Division of Fluid Dynamics Virtual Press Room will be launched in mid-November and will feature news releases, graphics, videos, and other information to aid in covering the meeting on site and remotely. See: http://www.aps.org/units/dfd/pressroom/index.cfm

GALLERY OF FLUID MOTION
Every year, the APS Division of Fluid Dynamics hosts posters and videos that show evocative images and graphics from either computational or experimental studies of flow phenomena. The outstanding entries are selected for their artistic content, originality, and ability to convey information. They will be honored during the meeting, placed on display at the 2013 APS March Meeting, and appear in the annual Gallery of Fluid Motion article in the American Institute of Physics' journal, Physics of Fluids.

Selected entries from the Gallery of Fluid Motion will be hosted as part of the Fluid Dynamics Virtual Press Room. In mid-November, when the Virtual Press Room is launched, another announcement will be sent out.

This release was prepared by the American Institute of Physics (AIP) on behalf of the American Physical Society's (APS) Division of Fluid Dynamics (DFD).

ABOUT THE APS DIVISION OF FLUID DYNAMICS
The Division of Fluid Dynamics of the American Physical Society (APS) exists for the advancement and diffusion of knowledge of the physics of fluids with special emphasis on the dynamical theories of the liquid, plastic and gaseous states of matter under all conditions of temperature and pressure. See: http://www.aps.org/units/dfd/