DEPARTMENT OF MECHANICAL & MATERIALS ENGINEERING
COLLEGE OF ENGINEERING AND APPLIED SCIENCES

SUMMER RESEARCH OPPORTUNITIES FOR UNDERGRADUATE WOMEN

APPLICATION DEADLINE: 03/01/2017

PROJECT TITLE: Erosion Measurement Development

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Project Description

Description: P&G produces premium consumer products: laundry detergents, shampoos, shaving products, diapers, and kitchen cleaning supplies that improve the lives of the world's consumers every day. Greater than half our products are liquid formulations that consumers get wet during use. Ensuring materials activate properly during dilution requires measures and models for the hydration of polymers and surfactants. These materials start out as low water ingredients (>70 wt% solids) and are viscoelastic (semi-solid). This role is to further develop a measure for relating the mechanical properties (rheology) of these materials as they hydrate under dynamic conditions (erosion).

Research Tasks: The student will be using bench-top mixers & rheometers to controllably rotate materials while they are suspended in liquid baths (i.e. water). Cameras will document the size of the drop over time; rheometers will track changes in bath viscosity. We have initial models that predict the rate of erosion (i.e. decrease in drop size) as a function of time and shear rate which we have not tested experimentally yet. The goal is to have the student check our hypotheses and learn the basic physics of hydration. Time allowing, the student would have the opportunity to suggest & implement improvements and suggest/test subsequent hypotheses.

Training and support that the mentor(s): Mentor will provide the instrumentation (includes rheometers, bench-top mixers, and cameras) and
training on how to perform experiments. Mentor will also provide samples to work with (soap/surfactants), and initial hypothesis and expectations for our current measurement device. As needed, the mentor will also provide training in microscopy to analyze material properties.

Requirements: Since this is an instrument-dependent role, the student would have to travel to our CETL facility (8256 Union Center Blvd, West Chester OH 45069) for the majority of the session (i.e. we cannot move the necessary equipment offsite).