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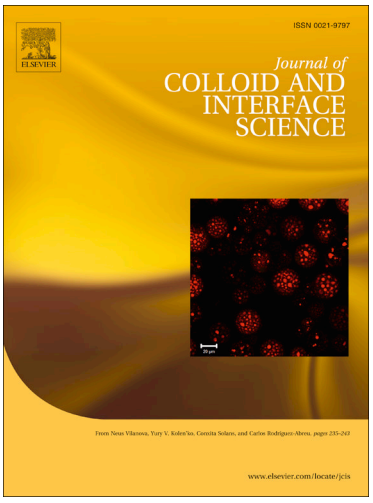

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Dynamic forces between emulsified water drops coated with Poly-Glycerol-Poly-Ricinoleate (PGPR) in Canola oil

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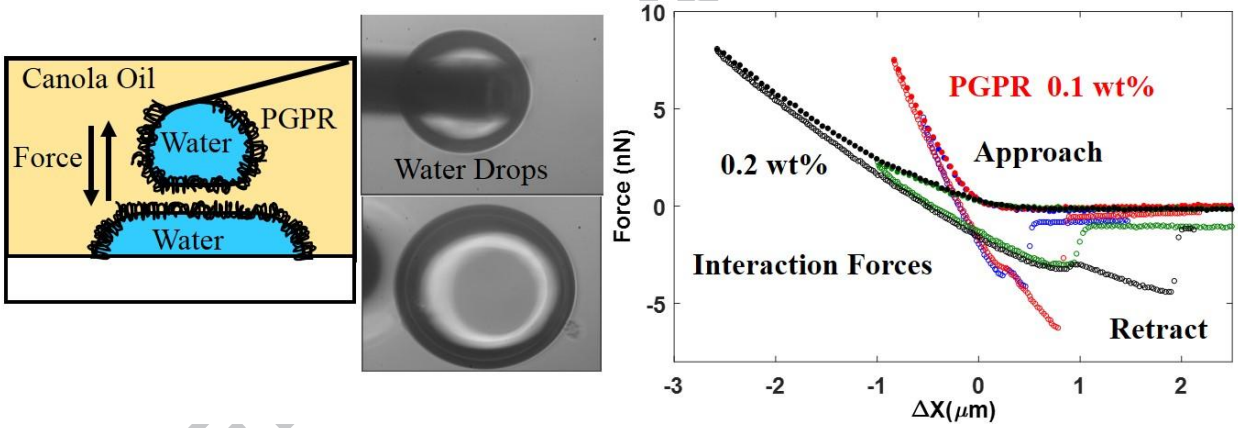
Graphical abstract



Abstract

The dynamic collision of emulsified water drops in the presence of non-ionic surfactants plays a crucial role in many practical applications. Interaction force between water drops coated with non-ionic food grade surfactants is expected to exhibit rich dynamic behavior that is not yet explored. The collision forces between immobilized water drops in canola oil in the presence of a well-known food grade surfactant polyglycerol polyricinoleate (PGPR) are measured at concentrations well below typically used to form stable emulsions. An extension or kink, attributed to a short-range attractive interaction due to PGPR bridging between the drops, was observed in the retract portion of the force curves at higher applied forces or slower collision velocities. The Stokes-Reynolds-Young-Laplace (SRYL) model was used to calculate theoretical force curves. For higher collisions velocities, the agreement between the calculated and experiment data was acceptable, but the SRYL model failed to describe the extension or kink feature observed at slower velocities below. Both the AFM data and the