

Viscoelastic effects during processing of complex fluids

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EPSRC Future Formulations Project
Complex ORAL health products (CORAL):
Characterisation modelling and manufacturing
challenges

4 .5 years project, £2M, support from GSK, Xaar, CPI
Chemical Engineering (Angeli, Mazzei)
Mechanical Engineering (Balabani, Tiwari)
Mathematics (Wilson)



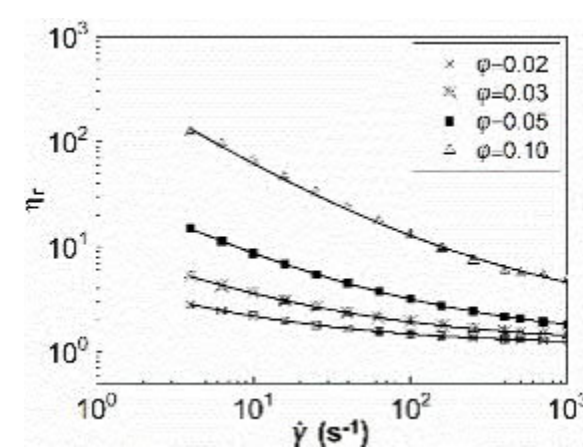
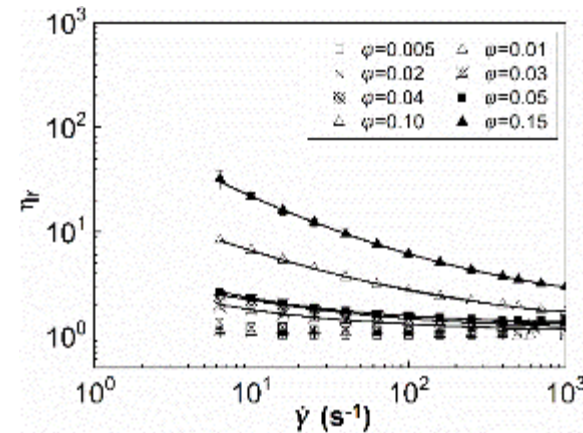
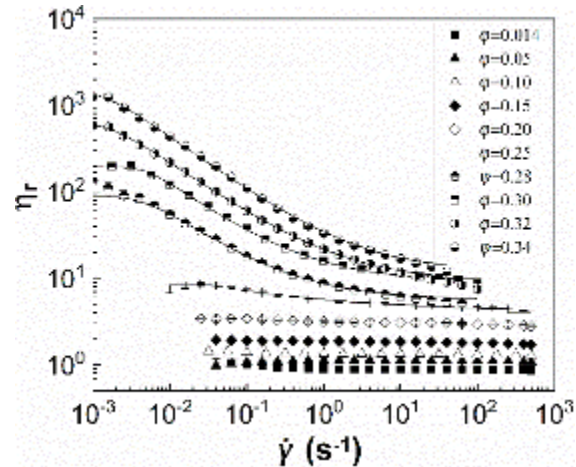
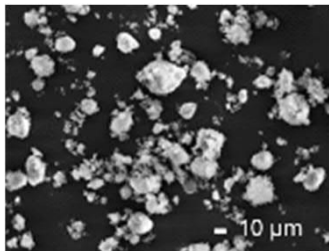
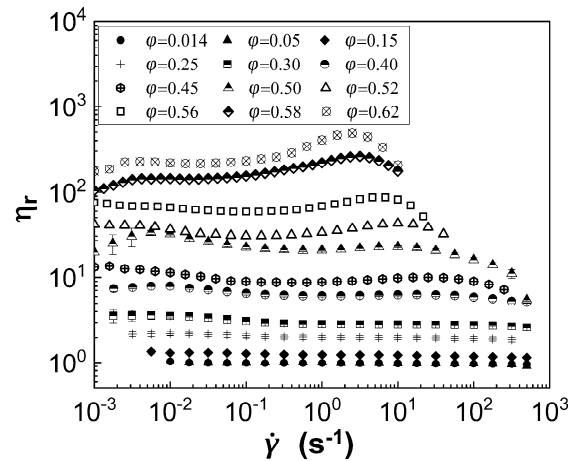
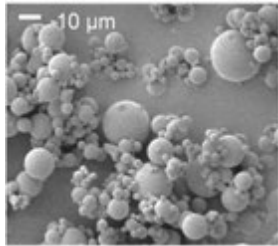
The main aim is to gain fundamental understanding and develop methodologies to aid manufacturing of complex formulations, including particle suspensions in non Newtonian fluids.

We follow a multiscale approach involving **mathematical analysis, numerical simulations and advanced experimentation**, to

- *study* the nonlinear rheology of the suspensions/pastes and the links to microscale interactions
- *develop* the modelling tools, to study the effects of process conditions on the suspension/paste rheology.

Suspensions in glycerol-Frictional

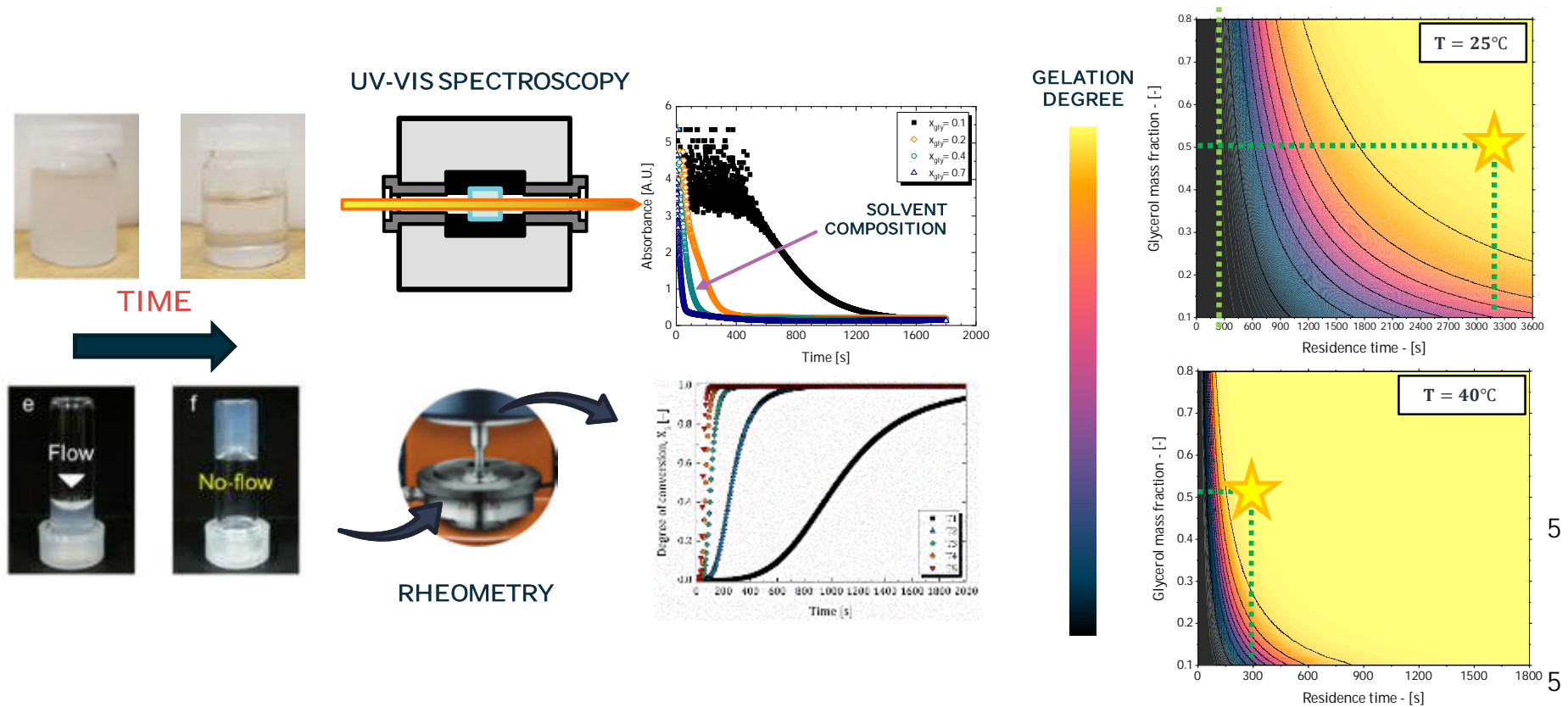
Suspensions in mineral oil-Adhesive



Papadopoulou A., Gillissen J.J, Wilson H.J, Tiwari M.K., Balabani S., 2020. 'On the shear thinning of non-Brownian suspensions: friction or adhesion?', *Journal of non-Newtonian fluid Mechanics*, 281, p.104298.

Gillissen, J.J.J, Papadopoulou, A., Tiwari M.K, Balabani S., Wilson H.J., 2020. 'Suspension rheology of adhesive particles at high shear rates.' *Physical Review Fluids*, 5, p. 053302.

- Characterisation of the gelation kinetics of carbopol in glycerol/PEG solutions
- Insight into the mechanism of gelation



Migliozzi, S. Angeli, P. & Mazzei, L. (2019). Gelation kinetics of non-aqueous carbopol dispersions. *Colloids and Surfaces A: Physicochemical and Engineering Aspects*. **577**, 84-95

-Elasticity and particle induced flow instabilities and transitions in Taylor-Couette Flows (TCF)

Tom Lacassagne, Stavroula Balabani

-Solids suspensions in viscoelastic media

Giovanni Meridiano, Wehelieye Weheliye, Luca Mazzei,
Panagiota Angeli