

SIMILARITIES AND DIFFERENCES BETWEEN LIVING POLYMERS AND SEMISOLID METAL ALLOYS

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The rheometric tests employed for studying wormlike micellar solutions - known as living polymers, are also applied to investigate the rheological response of semisolid metal alloys. Contrary to the common assumption of their Newtonian behaviour, some alloys exhibit shear-thinning and thixotropy right above their melting point. Using theories and rheological equations of state to model the flow of semisolid metal alloys provides an alternative and innovative method for elucidating the connection between the evolution of microstructures within these materials and the macroscopic characteristics of their flow. In this work, first, a discussion of the rheological features that living polymers and semisolid metals share is given. Then, the rheometric protocols widely used to characterize the non-Newtonian behaviour of living polymers, polymeric solutions, polymeric melts, and semisolid metal alloys are summarised, emphasizing those applicable to their mathematical modelling (Garcia-Beristain et al., 2023). Subsequently, the benefits of employing a theoretical approach proper to living polymers are exemplified in the description of the response of semisolid metals: the case of the rheological characterization of a semisolid A380 aluminum alloy (Solek y Szczepanik, 2015). This work concludes by showing how this characterization enabled simulations of a mixing procedure in industrial metal processing.

Keywords: Living Polymers, Flow simulation, Semisolid Al-alloys

Acknowledgment:

The support from Consejo Nacional de Humanidades, Ciencias y Tecnologías (CONAHCYT, México) for the scholarship (CVU number 1147394) to fund his post-graduate studies and the project CONAHCYT; grant number CF-2023-I-318. The support from Universidad Nacional Autónoma de México (PAPIIT IA102022, IN106424, IN100623 and PAIP 5000-9172 Facultad de Química).

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