

Rheology of Complex Materials: Assignment 5

20 points

Online submission as a pdf file only

1. Several example materials (examples graphene ink, nylon/glass fibers, curd etc), their possible applications and the importance of their rheological response were discussed in lectures.

Take an example of one material system (not discussed in lectures), and answer the following questions:

- (a) What are the key features of the macromolecules / multiple phases that make these systems?

Marks 2

- (b) What are the key molecular / microscopic mechanisms, that might be relevant for their rheological response?

Marks 3

- (c) What are different applications for these material systems, and why is deformation behaviour important?

Marks 2

- (d) How does knowledge about the microstructure help in understanding / predicting the deformation behaviour for this material?

- Key microstructural features
- Important interactions

Marks 4

- (e) Would the microstructure get possibly affected due to deformation, and if it does how does it get affected?

Marks 2

- (f) The knowledge of rheology will help in which of the following and why?

- (i) Optimum formulations of material systems
- (ii) Effective performance of material systems
- (iii) Materials processing with control

(iv) Efficient material processing methods

Marks 2

(g) Which type or combination of types of rheometric flow/s (shear and extension) should be used to study the rheology of this material?

Marks 2

(h) What would be the common mode of rheological characterization, such as stress relaxation, steady shear, oscillatory testing etc., and why?

Marks 3