Course Assignment for
Rheology of polymer melts and solutions – tools and analysis

For the course assignment, choose a sample relevant to your research topic. If it is confidential, you do not need to reveal the nature of the samples. We will only check the rheology data you obtain.

Steady shear:

1. Measure your sample with two different measurement systems and compare shear stress, viscosity, and torque.
2. Measure the same sample with different settings regarding the data acquisition of the measurement points. For the "Duration" select "Constant 1s" for the first measurement and any other setting for the second measurement.
3. Temperature dependence:
   a) Measure a temperature sweep. Define the temperature range according to your sample. Measure both heating and cooling phases.
   b) Measure your sample (flow curve) at 4 temperatures that are within the range in a).
   c) Plot the data (viscosity vs. temperature) in one graph.
   d) Calculate the Arrhenius activation energies of flow using the data obtained in a) and b).

Oscillation:

4. Perform an amplitude sweep
5. Perform a frequency sweep using a strain that is within the LVE as determined in 4.). Use the same settings as in 2.). Match the angular frequency range with the shear rate range chosen in 2.) and select the same number of measurement points.
6. Perform a frequency sweep at six different temperatures (overnight experiment)
7. Plot the viscosity data of 2.) and 5.) in one graph and check the validity of the Cox-Merz rule.
8. Calculate the mastercurves (complex viscosity and dynamic moduli) with the data of 6.) choosing a temperature that is within the measured temperature range.

Optical:

9. Measure your sample with the optical geometry and record any birefringence phenomena

Submission: Plot all graphs with a software other than RheoCompass and put them in document. Add the relevant measurement settings. Submit your report as pdf-file. In addition, add the RheoCompass project file to your submission.
Submit your assignment via email to Julian and Michael. After we have evaluated your assignment we will discuss the results together.