This project is part of a collaboration between Chalmers and Borealis on the commercially and scientifically important field of polymer nanocomposites. Borealis is a world leader of innovative plastics materials and have intensive research activities in a number of fields ranging from high voltage power cables to automotive parts and films used in the food industry, covering the entire range from polymer design and catalysis to processing and mechanical performance. Chalmers is recognised as a world-leading centre of excellence in material science ranging from fundamental to applied research and is the world centre of Graphene research.

The objective of this student project is to conduct an experimental study on the effect of different high aspect ratio fillers (graphene, nanotubes etc.) and different polymer architectures (linear, branched or polar chains) have on the resulting electrical, rheological and mechanical properties. Different polymer compounds on different polymeric types with a variety of filler loadings will be made and optimised. These compounds will then be tested and their overall performance will be assessed with respect to their electrical, rheological and mechanical properties. The work will be mainly based on the Department of Materials and Manufacturing Technology but support and equipment from the Department of Applied Physics and Chemistry and Chemical Engineering will also be available.

Some of questions that are central for our understanding of these phenomena that this project will aim to address are:

- *How different processing conditions affect the overall dispersion of high aspect ratio fillers?*
- *How the chain conformation affects the resulting electrical and mechanical performance?*
- *What is the effect of the different fillers on the overall crystallisation behaviour and resulting morphology?*

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