Stora Enso Consumer boards division, Innovation and R&D, Sweden

Stora Enso is a leading provider of renewable solutions in packaging, biomaterials, wood and paper on global markets. Our aim is to replace non-renewable materials by innovating and developing new products and services based on wood and other renewable materials. We employ some 27 000 people in more than 35 countries, and our sales 2015 were EUR 10 billion.

Master Thesis Work - Characterization and analysis of Cellulose-Polymer Composites

Location: Karstad research center, Karlstad, Sweden and/or University
Schedule: Spring 2017 corresponding to 30 ECTS, master thesis work
Organization: Innovation and R&D, Consumer boards

Description

The Material Development unit develops new materials for packaging applications with special focus on cellulose based renewable materials to replace plastics and aluminum. The team also produces demonstrators of the developed materials in its potential applications. Members in the team are working in or managing projects within the whole scope of developing and introducing new material to the market. The team is also a key contact point for external R&D providers in the operational field of the team as well as providing services to other Stora Enso units within the competences of the team.

Composites with a lower environmental impact are emerging on many markets today, especially composites with a high content of renewable material has been of particular commercial and consumer interest lately. Cellulose is a renewable material and could also be tailored to act as reinforcement in the composites. There are however several challenges associated with the processability, durability and mechanical properties in these kind of composite materials.

The research question we would like to study with this thesis work is the influence of low versus high content of hemicellulose (eg. MCC type of material versus different pulps) in cellulose polymer composites on mechanical properties, thermal stability and dispersive mixing. The polymer grades of interest would be polyethylene/polypropylene grades possibly combined with a coupling agent.

This master thesis work would most likely involve the following tools to answer the research question;

- Mechanical characterization of composites
- Thermal characterization of composites, i.e. with DSC, DMTA and/or TGA
- Rheological characterization, i.e. with oscillating rheometers or capillary rheometers
- Literature survey of specific related areas, i.e. carbon footprint, aging and degradation

This will require good interpersonal and cultural skills and ability to structure you task. The position offers a good opportunity to further develop your skills and network while working with key stakeholders within the area.

Qualifications

Education and experience
- Engineering or chemistry/physics background.
- Knowledge/experiences in one of the following areas is considered a merit:
  - Mechanical/thermal characterization of materials
  - Rheological measurements or calculations
  - Experiences in composites or cellulose containing materials
Please indicate clearly your experiences/courses/competences within these areas in your application.

**Personal**
- Master student who is driven by curiosity and is inspired by working with new sustainable materials.
- Good ability to work in matrix organizations
- Good ability to communicate in English

We are striving for ethnical diversity and an equal distribution of females and males. We are will pay great attention to your personal skills.

**Supervision**

Joined supervision between Stora Enso (Erik Stenvall) and Chalmers University of Technology (Antal Boldizar).

Examination at Chalmers University of Technology (Antal Boldizar).

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