

## **Master thesis: Method development for barrier coating fragment characterisation by Hyperspectral NIR-imaging**

The need for improved recyclability of cellulose-based consumer packaging and disposables is growing in importance. Both due to the desire to reduce plastics and also due to harder regulations. The recycling process may induce undesired partial fragmentation of barrier materials, thus producing unknown contribution to different material streams during and after the recycling process, and with negative recyclability and environmental impact.

The suggested work would develop a method for characterisation of barrier coating fragments in the size range 0.1 – 5 mm which are mixed with cellulose fibres. The suggested technique is hyperspectral NIR imaging to provide simultaneous measurements of both size and chemical nature of the fragments. Hyperspectral NIR imaging is an emerging technology due to recent advances in both NIR imaging and advanced data analysis approaches (Machine learning).

Developments of methods for proper characterisation is a foundation for achieving optimised recycling processes and improved design for recyclability. The main target of the work is to develop and expand a method for that could be used for such purposes. The results may also be part of peer reviewed scientific publications.

### **Regarding the thesis**

We are looking for a student who wants to complete the Master Thesis in the spring of 2023.

The suggested work would further develop the utilisation of hyperspectral NIR-imaging for the purpose of barrier fragments analysis in recycled pulp streams. In the course of this work, you will practise method development including test design, preparation of reference samples, and data modelling. You would also acquire skills in hyperspectral NIR-imaging and spectral classification using commercial software.

The thesis work will combine experimental and analytical parts. The experiments will be performed at the RISE facilities on the KTH campus in Stockholm (Drottning Kristinas väg 61).

### **Who are you?**

You as an applicant should be driven and work in a structured way. You should appreciate both practical work in the lab as well as more theoretical data analysis. You should be someone with an ongoing education at master's level.

### **Supervisors**

Thomas Grahn, Peter Hansen, RISE

### **Welcome with your application!**

If you have any questions, you are welcome to contact Peter Hansen ([peter.hansen@ri.se](mailto:peter.hansen@ri.se) tel 076-8767236). The last day for application is 2023-01-13. However, expression of interest will be processed on an ongoing basis.

### **About RISE division Pulp, Paper and Packaging**

At RISE division Pulp Paper & Packaging we work with a wide range of fibre-based materials, such as tissue, paper, cardboard and packaging. Our work and know-how extend all the way from the choice of fibre, via all stages of manufacturing and unit operations to the evaluation of the product properties. We are also heavily engaged in the progression towards a cellulose based sustainable society and has

a central role in several industrial networks and associations regarding materials and process developments for recycling of materials, on a European level.