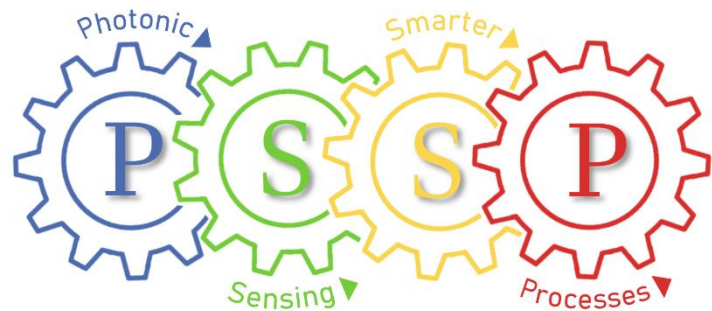


PSSP
Photonic Sensing for Smarter Processes

Programme: COMET – Competence Centers for Excellent Technologies

Programme line: COMET-Project

Duration: 2018 - 2022



WATER REVEALED BY LIGHT

CONTACTLESS MOISTURE MEASUREMENT USING COST-EFFICIENT NEAR-INFRARED SPECTROMETER TECHNOLOGY

Knowledge about exact product moisture content has a high priority in many industrial branches including wood, paper, food, as well as chemical and pharmaceutical industry.

One reason for that are strict limits that have to be adhered to when it comes to water content of the products to ensure high product purity and quality. Especially in the food industry, high product moisture can significantly reduce shelf-life by causing mold-induced spoilage, leading to increased amounts of food waste. Furthermore, many products are traded by weight, causing severe economic consequences.

Despite these facts, product moisture determination in the industry is mainly carried out using gravimetric offline measurements, which can only provide time-

delayed values and are thus not suitable for inline measurements and process control.

In the course of the PSSP-project, the research institute RECENDT and project partner Lenzing AG joined forces to develop an alternative method for product moisture measurement based on the absorption of near-infrared light.

To precisely measure the moisture content, harmless electromagnetic radiation in the near-infrared region of the electromagnetic spectrum is directed onto the product and a spectrally resolved measurement of the back-reflected radiation is carried out. This measurement reveals the specific absorption bands of the water, which are proportional to the water content of the tested product.

SUCCESS STORY

State-of-the-art spectrometer technology based on so-called micro-electro-mechanical systems (MEMS) allows for the first time to implement such a measurement in a both cost-efficient and industry suitable way. Using modern data analysis methods based on machine learning, precise values for product moisture can be extracted from the acquired absorption spectra in real time and can be used for inline process monitoring and control.

This measurement technique is suitable for all sorts of solid materials including food, chemicals, wood, paper, agricultural products, textiles or plastics, just to name a few. Additionally it allows for precise contactless measurements from a relatively large distance (approximately 0.5 m).

Impact and effects

The developed measurement system was already successfully implemented at the project partner Lenzing AG and reliably delivers moisture readings inline and in real time.

This real-time monitoring allows for better control of the drying process, which in turn allows for optimization and potentially early corrections of

drying parameters, resulting in energy savings and increased product quality.



Laboratory setup for moisture determination using near-infrared spectroscopy.
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Project coordination (Story)

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Project partner

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- Lenzing AG, Austria

This success story was provided by the consortium leader/centre management and by the mentioned project partners for the purpose of being published on the FFG website. Further information on COMET: www.ffg.at/comet