

COMET MODULE

I³SENSE - INTELLIGENT, INTEGRATED AND IMPREGNATED CELLULOSE BASED SENSORS

Main location: Linz (Upper Austria)

Other locations: St. Veit an der Glan (Carinthia), Tulln (Lower Austria)

Thematic area: Material & Produktion

(according to www.ffg.at/comet/netzwerk)



Thematic focuses

Natural fiber reinforced composites (NFC) and load-bearing wood composites are a sustainable basis for a new generation of high-performance and environmentally compatible structural materials. Potential applications are broad, ranging from automotive and construction to renewable energy generation. Unsolved challenges for application in these areas are the extreme hygrothermal and mechanical loads and the resulting damage, in many cases with catastrophic effects (breakage of wind blades, collapse of statically important building parts, etc.). Early detection of moisture-related overstress, the impact of small imbalances in manufacturing and the like is therefore a critical success factor.

The goal of i³Sense is to unlock the full potential of sustainable composites in a wide range of applications and provide safe alternatives to conventional systems with high carbon footprints using smart, integrated, and impregnated cellulose-based sensors.

Planned realisation and outcomes

To solve this challenge, we will take a radically new approach in which the sustainable materials themselves (wood, the reinforcing fibers, and/or the matrix) become an imperceptible embedded sensing system. In our approach we are capable of measuring changes in moisture, mechanical stress, and temperature in situ without compromising the structural integrity of the high-tech composites, which will allow us to close the gap between sustainability and performance.

The research objectives are:

- To understand how hygrothermal and mechanical stresses alter the electrical properties of the polymeric matrix or adhesive, the composite, and the materials used,
- to explore how these properties can be exploited (modified) and read out,
- to use this knowledge to detect the changes in state in real time,
- to study how the modification interacts with the matrix and changes the properties,
- monitor structural integrity over long periods of time.

COMET FACTSHEET

Selected company partners (max. 10):

1. Audi AG
2. FACC Operations GmbH
3. FunderMax GmbH
4. Hendrickson Commercial Vehicles Europe GmbH
5. Kästle GmbH
6. Metadynea Austria GmbH
7. Papierfabrik Wattens GmbH & Co. KG
8. RAC GmbH
9. Stora Enso Wood Products GmbH

Selected scientific partners (max. 5):

1. ETH Zürich
2. Johannes Kepler Universität Linz
3. Mendel Universität Brno
4. Universität für Bodenkultur
5. Universität Bremen

Selected international¹ partners (max. 5):

1. Audi AG
2. Mendel Universität Brno
3. ETH Zürich
4. Universität Bremen

Duration:	01.01.2022 - 31.12.2025 (4 Years)
Staff employment:	110 FTE, thereof 82 scientists
Management:	DI Boris Hultsch (Geschäftsführung; CEO) Prof. Dr. Wolfgang Gindl-Altmatter (wissenschaftliche Leitung)
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¹ Partners with headquarters outside Austria