

## COMET MODULE

### A3RED – ACCELERATED DESIGN OF ADVANCED ALLOYS WITH REDUCED CRITICAL RAW MATERIALS CONTENT

**Main location:** Leoben (Styria)

**Other locations:** none

**Thematic area:** Materials and Production

(according to [www.ffg.at/comet/netzwerk](http://www.ffg.at/comet/netzwerk))



#### Thematic focuses

- Hybrid multi-scale accelerated materials design loops for fast identification of optimized new materials
- Novel experimental methods for the synthesis, processing and characterization of new advanced materials
- AI-based scale bridging from atomic to continuum scale by linking physical and machine learning models to understand complex mechanisms on a physical basis and extract relevant relations
- FAIR (findable, accessible, interoperable, reusable) tools (physical and machine learning models) and data (from experiment, theory and literature) for efficient materials design
- Demonstration by exemplary critical raw material reduction and/or increased secondary raw material usage for three promising material classes.

#### Planned realisation and outcomes

The aim of COMET Module **A3Red** is the accelerated, AI-driven design of high-performance alloys with low or zero critical raw material content. For this sake, generic building blocks for multi-scale modelling of materials will be developed and integrated into an interoperable and modular research platform. The multi-scale modelling will leverage the inherent process-structure-property relationships of metallic and intermetallic materials, bridging the gap between the atomic and continuum scales using machine learning approaches. The platform and developed models will be modular in design and validated for the selected alloys. **A3Red** will focus on functional magnetic materials that are free of rare earth elements, on secondary source advanced aluminium alloys for use in high-strength structural applications and high-conductivity electrical overhead power lines, as well as on high-strength, and on radically new high-temperature-resistant metal alloys. Notably, the methodology being developed will serve as a foundation for future applications to any type of material and processing, and it may even be extended to integrated product engineering.

## COMET FACTSHEET

### Selected company partners (max. 10):

1. AMAG rolling GmbH
2. LUMPI-BERNDORF Draht- und Seilwerk GmbH
3. MAGNA Auteca GmbH
4. Miba Sinter Austria GmbH
5. Treibacher Industrie AG
6. MatCalc Engineering GmbH

### Selected scientific partners (max. 5):

1. Austrian Academy of Sciences – Erich Schmid Institute of Materials Science
2. Montanuniversität Leoben – Chair of Nonferrous Metallurgy
3. TU Wien – Institute of Materials Science and Technology
4. University for Continuing Education Krems – Center for Modeling and Simulation
5. FH-OÖ Forschung und Entwicklung

### Selected international<sup>1</sup> partners (max. 5):

1. Czech Academy of Sciences – Institute of Physics of Materials
2. Max-Planck-Institut für Nachhaltige Materialien GmbH

**Duration:** 01.01.2026 – 31.12.2029 (4 years)

**Staff employment:** 7.31 FTE, thereof 6.31 scientists

**Management:** Daniel Scheiber, Group Leader and Modul Manager  
Natalia Bedoya, Team Leader and Data Steward  
Werner Ecker, General Manager MCL

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<sup>1</sup> Partners with headquarters outside Austria