

CAPABILITY SHEET – RFCS 2026 Cooperation

WHO WE ARE

The Faculty of Materials, Metallurgy and Recycling (FMMR) at the **Technical University of Košice** is the only Slovak faculty specialised in iron and steel metallurgy, materials science, physical metallurgy, solid state physics, technologies for chemical processing of mineral raw materials and recycling technologies. We provide advanced laboratory, analytical and modelling capacities with more than 20 years of applied research experience in cooperation with major industrial partners.

KEY EXPERTISE RELEVANT FOR RFCS 2026

- Analysis and prediction of carbon footprint of metallurgical industry
- Hydrogen-based iron ore reduction & thermodynamic optimization
- High-temperature corrosion in oxidation environment
- Advanced material characterization (SEM, TEM, XRD, in-situ diffraction)
- Material limit states, corrosion, material degradation and prediction of material lifetime
- Phase transformations, thermal and chemical-thermal processing of materials
- Controlled hot plastic deformation and controlled cooling processes
- Advanced materials, nanomaterials and materials for advanced technologies - materials for batteries and hydrogen technologies
- Gas absorption analysis (H_2 , CO_2 , CH_4) & PCT isotherms
- CFD modelling, combustion optimization & digital twins (MATLAB / Python / FEM)
- Recycling of steelmaking residues & hydrometallurgical Zn recovery (lab & pilot scale)

WHO ARE WE LOOKING FOR

We are looking for researchers and institutions currently thinking about developing a common proposal for the following RFCS call:

- RFCS-2026-02-RPJ Steel - Research projects

VALUE FOR COORDINATORS

- ✓ Experimental validation support (TRL 1–5)
- ✓ Materials testing & microstructural analysis leadership
- ✓ Modelling and simulation of metallurgical processes
- ✓ Circular metallurgy & residue valorisation expertise
- ✓ Industrial collaboration background
- ✓ Strategic Central European research partner

OUR EXPERIENCE IN RELEVANT PROJECTS

We have a strong track record in applied research and industrial collaboration in the steel sector, combining experimental research with modelling and digitalization.

- **Smart-Steel: AI-Driven control models for future steel productions** (~EUR 1 million, in cooperation with **U.S. Steel Košice, s.r.o.**) – development of AI-based models for process optimisation, prediction and control.
- **Analytical modelling of nitrogen content prediction in pig iron and molten steel** (Fellowships for Excellent Researchers (R2–R4)) - focused on predictive modelling of key metallurgical parameter
- **Sustainability** (in cooperation with **U. S. Steel Košice, s.r.o.**) - integrated energy-material model for Scope 1–3 emissions, ETS-based accounting and predictive gas energy modeling
- **Assessment of the potential for hydrogen utilisation in the Slovak metallurgical industry to reduce CO₂ emissions** (national competitive research project)

CONTACT

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