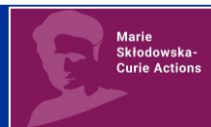




Open PhD Position in European Industrial Doctoral Network (DN-ID)



www.cesaref.eu

Concerted European action on Sustainable Applications of REfractories (CESAREF)

What is CESAREF and what is the focus of this network?

CESAREF will train researchers in multi-engineering areas and expose them to the academic and non-academic sectors through international and inter-sectoral mobility combined with an innovation-oriented mind-set. They will get the right combination of research-related and transferable competences in the **full production-to-the-end-of-life cycle of refractory materials applied to Iron & Steelmaking processes** with regards to the new operation conditions requested by the drastic reduction of greenhouse gas emissions, improved energy efficiency, and by life cycle assessment requirements. An important part of the project will be dedicated to the sustainability of refractories, including recycling issues, using the **Life Cycle Assessment** methodology. **15 doctoral candidates** will take advantage of the most sophisticated numerical tools and laboratory equipment to model, design and predict the life of refractory materials in critical operational conditions. Being trained in scientific, technical, and soft skills, these PhDs are the next generation of highly employable scientists and engineers in the refractory sector and related areas. New testing methods and models will be developed to address the Scientific/Technological challenges for these applications and help to design better performing and sustainable refractory materials and linings. The research training is implemented through strong relationships between 10 academia and 16 industrial partners across the EU. The CESAREF network (www.cesaref.eu) is structured to take full advantage of intensive cooperation between **academia, raw material suppliers, refractory suppliers and high-tech metal component producers** with a direct link to the **FIRE federation** (fire-refractory.org).

Specific subject of PhD14 (one of 15 PhDs of the CESAREF DN-ID project)

PhD14 Topic: Smart Factory: Predicting thermal behaviour of steel ladles with advanced digital methods for improving the thermal efficiency

Objectives: To develop a method for computing the temperatures inside the ladle wall and lining from measured data. This method will be generic in the sense that it will be applicable to different kinds of ladles. The method will be capable of predicting the state of a ladle, considering the degradation of the refractory lining (PhD13). The method will be validated with data from a steel plant. Furthermore, a sensor concept to collect meaningful, real-time data to track the thermal state of a ladle will be proposed.

Expected Results: Modelling approach to generate detailed and high-performance models of the thermal behaviour of a ladle, which are validated with data from a steel making process. These methods will be capable of predicting the temperatures in the inner layers of the refractory lining to improve refractory lifetime and reduce heat losses. An instrumentation layout for online monitoring of temperature and precise predictions.

Keywords: Thermal modelling, prediction, model reduction, sensor placement

Applicant Profile: **Master's level in Mechanical engineering, Technical physics, Computer science/engineering, Material science.** Candidates should have in-depth knowledge in at least one of the following subject areas: thermal engineering, numerical methods, FEM. Excellent programming skills. Excellent oral and written communication skills (English). Ability to work in an interdisciplinary team. Proactivity. Willingness to travel frequently.

PhD main locations:

Period 1 - TU Wien (www.tuwien.at), Vienna, Austria (18 months)

Period 2 - ArcelorMittal (www.corporate.arcelormittal.com), Maizières-lès-Metz, (18 months)

Due to the Mobility Rule by the funding agency, residents of Austria cannot apply for this PhD14 position

Apply until June 27th following indications at www.cesaref.eu/recruitment-procedure

If you have any questions, feel free to contact the supervisors:

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