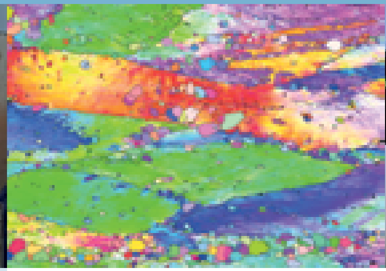

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Doctoral Programme

The International Max Planck Research School SurMat: Interface controlled materials for energy conversion (IMPRS-SurMat) is a structured three-year doctoral programme.

The school is a cooperative effort of the Max Planck Institutes of Eisenforschung, Kohlenforschung, Chemische Energiekonversion and of the Ruhr-Universität Bochum and the Universität Duisburg-Essen. It provides excellent research conditions plus an interdisciplinary teaching programme connecting chemistry, physics, material- and engineering science. The experimental and theoretical research focuses on interfaces of advanced materials. The working language is English.

Successful applicants will work at one of the cooperation partners. Besides receiving funding the doctoral students will get the possibility to attend international conferences, soft-skill trainings and language courses.

IMPRS SURMAT

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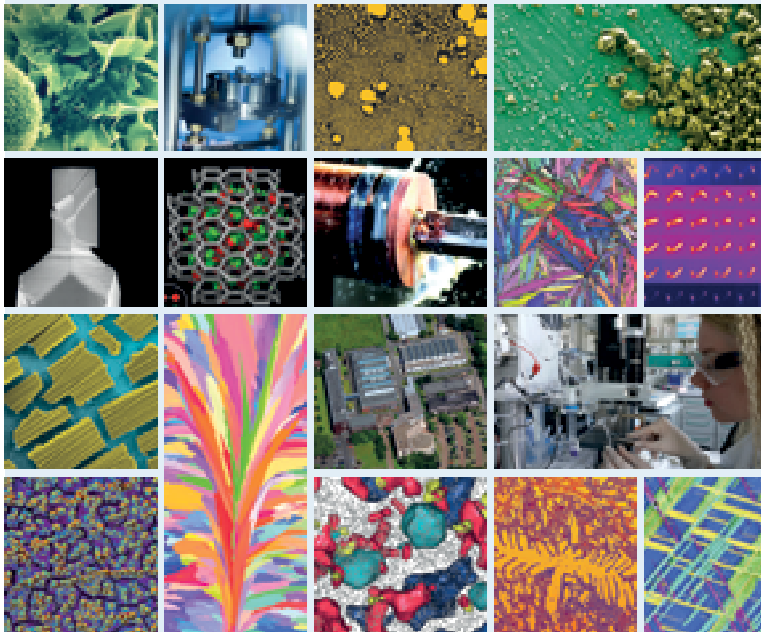
INSIDE

the WORLD of

MATERIALS RESEARCH

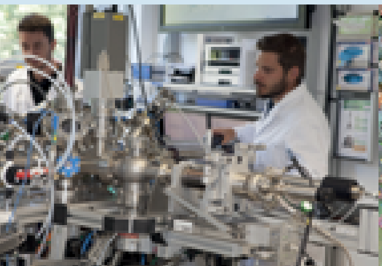


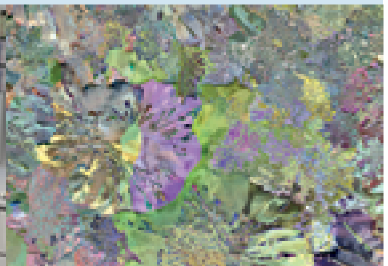
The **Max-Planck-Institut für Eisenforschung GmbH** (MPIE) was founded 1917 as the Kaiser-Wilhelm-Institut für Eisenforschung. It is financed by the Max Planck Society and the Steel Institute VDEh, the representative of the steel industry in Germany. This unique structure of a public private partnership allows outstanding basic research close to application.

Mission

The MPIE conducts research on structural metallic alloys and related materials. An essential target of the investigations is an improved understanding of the complex physical processes and chemical reactions of these materials. In addition, new high-performance materials with outstanding physical and mechanical properties are developed to be used as high-tech structural and functional components. The main fields of application are:

Energy
Infrastructure
Medicine
Mobility
Safety





Structure

The MPIE with its international team of about 300 people coming from more than 30 nations consists of four departments, each headed by one director:

Computational Materials Design
Prof. Jörg Neugebauer

Interface Chemistry and Surface Engineering
Prof. Martin Stratmann*

Microstructure Physics and Alloy Design
Prof. Dierk Raabe

Structure and Nano-/Micromechanics of Materials
Prof. Gerhard Dehm

Departments

The department **Computational Materials Design** develops computer simulations for iron, steel and related materials based on quantum-mechanical methods which allows to reach a hitherto not achievable accuracy. The methods developed in the department enable, in collaboration with the experimental departments of the institute, the prediction, synthesis and characterisation of novel materials combinations, the identification of degradation mechanisms, as well as strategies to impede them.

Fundamental research in the field of electrochemistry is conducted in the department **Interface Chemistry and Surface Engineering**. The research combines electrochemistry with a surface and interface science approach. Moreover, the development of novel experimental methods is of great importance. Main research topics are corrosion and intelligent corrosion protection, hydrogen in materials, surface treatments, interfacial stability of coatings, and the efficiency and stability of catalysts, e.g. in fuel cells.

*on leave for the time of his presidency of the Max Planck Society. Temporary director: Prof. J. Neugebauer

Exploring the relationship between the synthesis, structure and properties of nanostructured engineering alloys is the mission of the department **Microstructure Physics and Alloy Design**. To study these compounds, the group develops advanced characterisation methods from the single atom level up to the macroscopic scale and applies them together with scale-matching multiscale methods. Research topics are e.g. combinatorial development of advanced high strength alloys, energy materials and structural alloys for light weight design.

The department **Structure and Nano-/Micromechanics of Materials** employs high resolution electron microscopy and advanced synchrotron diffraction techniques to explore the microstructure and chemistry of materials down to the atomic level. These studies are also performed *in situ* under mechanical, tribological, thermal and chemical environments. Additionally, we develop precise nano- and micromechanical methods with the aim to enhance the performance of nanostructured and high temperature materials.