

Institute of solid state physics has successfully participated in nuclear fusion project competition.

Institute of Solid State Physics (University of Latvia) is chosen as a coordinating institution for the EUROFUSION project CfP-WP15-ENR-01/UL-01 (*When and how ODS particles are formed? - X-ray Absorption Spectroscopy and atomic-scale modelling of ODS steels.*)

ITER project (<https://www.iter.org/>) is a large-scale international experiment with the aim to prove the potentiality of nuclear fusion as an energy source and to develop solutions for the next-generation nuclear fusion plants, which will be designed for electricity production. EUROfusion consortium (<https://www.euro-fusion.org/>) represents European institutions that are participating in the ITER project, and Institute of Solid State Physics (University of Latvia) is among them.

One of the challenges for ITER and consequent fusion projects is the development of novel materials that would be suitable for the exploitation under the extreme conditions that are expected in the reactors of *Tokamak*-type fusion facilities. The main research object of the project that is carried out in ISSP, are radiation and temperature resistant ODS (oxide dispersion strengthened) steels. ODS steels consist of iron-chromium alloy matrix, in which the nanoparticles of oxides (mostly yttria and titania) are incorporated. It is known that these steels are promising materials for operation in extreme conditions: the addition of oxide nanoparticles improves the high-temperature mechanical properties of steels, as well as their radiation resistance. Therefore ODS steels are considered as one of the candidate materials for the construction of plasma-facing parts of fusion facilities.

The project, coordinated by ISSP, is carried out in collaboration with Karlsruhe Institute of Technology (KIT, Germany), and its goal is to advance the understanding of ODS particle formation and incorporation processes, using the possibilities, provided by X-ray absorption spectroscopy, multi-scale theoretical modeling approaches and high-performance computing systems. Within this project the X-ray absorption measurements will be carried out at international synchrotron radiation facilities both for ODS steels samples, produced by KIT, and for model materials (thin films), produced in ISSP, to obtain unique information regarding local surrounding of atoms of different types in ODS material, as well as atomic and electronic structure of ODS particles. On the other hand, using state-of-the-art atomistic simulation techniques, a better understanding of interactions of oxide nanoparticles with steel matrix will be obtained, and one will be able to follow the formation process of ODS particles in details.

In this project, headed by Dr. habil. Phys. Juris Purans, researchers from EXAFS spectroscopy laboratory (<http://www.dragon.lv/exafs/>) and Department of Theoretical Physics and Computer Modeling, Institute of Solid State Physics (<http://www.cfi.lu.lv/teor/index.html>), are involved.

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