

Overview of the R&D of Materials Intended for DEMO and DONES at Lithuanian Energy Institute

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Research interest in nuclear fusion is being substantiated by the increasing demand of sustainable energy source with low carbon emissions. At the moment, nuclear fusion research in European Union is being coordinated according to EUROfusion programme, which has a primary goal to enable fusion based energy production. Lithuanian Energy Institute (LEI) is an active contributor in EUROfusion research. Relevance of Nuclear fusion neutronic research is grounded in device nuclear safety and successful operation assurance. Nuclear fusion devices provide unique irradiation setup with high neutron energies and high neutron fluxes. Activities related to neutron transport and material activation are carried out at Lithuanian Energy Institute. LEI scientists carry out research related to demonstration power station (DEMO). DEMO numerical model is being utilized in order to obtain neutron irradiation induced activity and decay heat inventories for certain functional and structural segments of the reactor e.g. breeder blanket, divertor, vacuum vessel and others. DEMO is supposed to be the first nuclear fusion based power plant providing net electricity to the grid. So far the project is still in the development stage and relies on future fusion experiments as well as material qualification. One of the devices designated for material qualification is DEMO Oriented Neutron Source (DONES) D-Li source based accelerator facility. For DONES project, LEI contributes with Test Cell structure and functional materials (including reduced activation ferritic martensitic (RAFM) steels) activation/decay heat calculations and provides DPA estimates. Nuclear fusion neutronic research at LEI is being performed with application of MCNP neutron transport and FISPACT activation calculation codes.