



HUNGARIAN ACADEMY OF SCIENCES
BUDAPEST NEUTRON CENTRE

Association of the *Centre for Energy Research* and *Wigner Research Centre for Physics*

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Evaluation Report on the project

'A system for neutron *operando* monitoring and diagnostics of materials and interfaces for electrochemical energy storage devices at the IBR-2 reactor'

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The project is aimed to develop neutron scattering techniques at the IBR-2 pulsed reactor to monitor and study the structural evolution of electrochemical interfaces and electrode materials of different types for lithium-based batteries and accumulators in the *operando* mode. Due to widespread applications in practical and functional systems, the knowledge about the processes which occur in hidden electrochemical interfaces and electrode materials is of great importance. The project targets at the creation of a specialized sample environment system combining common technical approaches for several methods of thermal neutron scattering including neutron diffraction, neutron reflectometry and small-angle neutron scattering. The application of neutrons in this case is justified by the high penetrating power of this kind of radiation, as well as by the possibility to apply the contrast variation technique based on hydrogen/deuterium isotope substitution. This is extremely important in the study of systems which are close in feature to real electrochemical energy storage devices.

The successful development of the User Program at any operating neutron source like the IBR-2 reactor is determined by the possibilities to perform complex experiments in various fields of condensed matter physics. This project is a serious step in this direction, since its implementation will broaden the range of experimental approaches to solve the problems of one of the most active applied research fields nowadays. I am fairly convinced that the number of experimental proposals related to this topic, as well as the number of research centres involved in the User Program at IBR-2 will significantly increase after the implementation of the project.

Without any doubt, sample environment equipment is a major factor in the competitiveness of a large scale facility, thus the present project represents a very strong scientific case. Its implementation will increase the status of research at the IBR-2 reactor, thus ensuring the leading position of JINR in the field of multidisciplinary neutron applications over the next decade. The high professional qualification of the project team and the technical background are the solid basis to conclude that the project will be fulfilled within the planned schedule and the full scope of the work.

Budapest, May 8, 2017.

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