2011/12/27: Neutron Program Advisory Committee

Program ID: 2012S01

Title: Studies on Dynamics in Condensed Matters by using the High Resolution Chopper Spectrometer

Principal Investigator: Shinichi Itoh and Taku J. Sato

Decision: accepted (as a new proposal)

Beam allocation: 160 days (β = 80%)

Approval and suggestion(s) to IMSS: Rank A. Requested budget and resources are reasonable and should be supported by IMSS.

Comments:

The inelastic neutron scattering provides the microscopic information on the material properties via the direct measurement of the double differential scattering cross section $S(q,\omega)$, i.e. the Fourier transformation of the two-body correlation function along the spatial coordinates and the time. The proposed research program is on the construction of the High Resolution Chopper Spectrometer (HRC) at the beamline BL12 together with the exhaustive survey of the inelastic neutron scattering over typical compounds. The sample compounds are selected to be representing categories of materials in the point of view of the strength of couplings among the atomic position, atomic effective potential, electron orbital angular momentum and electron spin. The survey will be the basis to overview the neutron-based material researches at the KENS and should be promoted with a high priority by the IMSS.

We evaluate that the instrument has been developed almost on schedule except for the incomplete detector coverage due to the escalated price of the ^{3}He gas. We also evaluate that the instrument performance and preliminary studies of planned sample compounds have been well-analyzed and published.

We rate the research program 2012S01 as the rank A, and recommend to allocate 120-day beam time for data production and 40-day beam time for the instrument commissioning thus 160-day beam time in total assuming the average primary proton beam power of 200 kW. The allocation corresponds to the annual fraction of the beam allocation of β = 80%. In case the beam power is lower than 200 kW, we recommend to allocate additional beam time by decreasing the beam supply to other research programs approved through the general applications.

We recommend the IMSS to support financially as described in the proposal except for the detector procurement. The detector cost should be separately considered and should be supported on the earliest occasion.

2011/12/27: Neutron Program Advisory Committee

Program ID: 2009S03
Title: Fundamental Physics with Pulsed Cold Neutrons
Principal Investigator: Hirohiko M. Shimizu
Brief summary of the proposal:

High precision measurements on physical properties of neutron itself have renewed importance in fundamental physics, providing key new information needed in high-energy elementary-particle researches. The proposed project aims to determine the neutron lifetime by taking advantage of the achievements by this group in the advanced neutron optics, and has possibility to attain experimental accuracies beyond the technical limits in existing methods. The J-PARC BL05 beam line is regarded as being at a stage establishing the basis for realization of such measurements. Also, the advanced neutron optical devices and techniques to be developed in this project, such as those using the neutron avalanche, scattering and interference, are expected to contribute directly to other neutron scattering researches in material and life sciences.

Decision: A
Beam time allocation: 152 (days/year) (β = 80%)
Approval and suggestion(s) to IMSS: budget and resources: 78 M yen

Comments:

- The science described in the proposal is very convincing. Also, it is recognized that high-level developments have progressed by organizing many of university people.
- Neutron lifetime experiment should be regarded as the first-priority task. Since there are competitors in the world, the expected results should be obtained in a few years. The measurement method is unique and it seems very sure to succeed.
- Growth of younger scientists through this project can be appreciated.
- The scientific evaluation should be better made in cooperation with IPNS of KEK.
- The segregation between this S-type proposal and other general-use proposals should be considered in future. It should be considered not to exclude proposals by people who do not belong to this S-type proposal. Beginners should be welcome.

2011/12/27: Neutron Program Advisory Committee

Program ID: 2009S04

Title: Technical feasibility study of mini-focusing small-angle neutron scattering instrument

Principal Investigator: Michihiro Furusaka

Brief summary of the proposal:

A mini-focusing small-angle neutron scattering instrument for many SANS users has been developed and been recently applied to structural analysis of steels. Key devices to make it completed are a focusing mirror and a high -resolution area detector. In FY2012 a Kirkpatrick-Baez mirror and a MSGC with 80% in detection efficiency are developed.

Decision: A

Beam time allocation: 20 (days/year) ($\beta =$) for a proper beamline

Approval and suggestion(s) to IMSS: budget and resources:

Comments:

Development of a mini-focusing small-angle neutron scattering instrument has been progressed and test measurements have been practically started.

This proposal is a high priority one for use promotion of small-angle neutron scattering technique.

Development of a focusing mirror is a first priority. A shield should be prepared for the experiments with a proper beamline.

Consideration on design of a practical instrument is expected.

Experiments using an existing beamline is recommended.

2011/12/27: Neutron Program Advisory Committee

Program ID: 2009S05
Title: Structural study of functional materials and development of advanced methodology using SuperHRPD
Principal Investigator: Yukio Noda

Decision: A
Beam time allocation: 132 (days/year) (β = 66%)
Approval and suggestion(s) to IMSS: budget and resources:
The committee approves the continuation of this project.

Comments:

Based on the very high resolution of SuperHRPD, this proposal aims to: 1) perform structural studies on ferroelectrics and strongly correlated electron systems 2) perform various experiments with ionic conductors and battery materials 3) develop powder diffraction techniques for organic/polymer/biological molecules. Hence, there is a broad appeal for both industry and academia, and this project should be pursued to its fullest in order to raise J-PARC's worldwide visibility. The project members are all at the cutting edge of their own fields, and with close collaboration among them, I expect many good results.

The resolution achieved before the 3/11 Earthquake did not achieve full target values, but already surpassed all other existing facilities. Some publications concerning strongly correlated electron systems, multiferroics, and organic materials are either published or in submission. The fact that concrete results are already being produced indicates that this project is headed in the right direction. It seems that recovery efforts from the 3/11 Earthquake are also on track, which is reassuring.

The main issue for next year is how continuing to improve the instrumentation/analysis components given the weak beam intensity, amidst the recovery efforts. Incremental goals should be established, hopefully with interesting results at each milestone. In order to achieve $\Delta d/d=0.03\%$, a detailed roadmap must be established, and a work schedule and budget for this must be presented.

I am sure that interesting results will continue to come from this diffractometer, and these should be published without delay. For multiferroics, competition is fierce,

so having in-situ measurements under magnetic fields would be a strong point; this should be included in the budget.

2011/12/27: Neutron Program Advisory Committee

Program ID: 2012S06
Title: Fundamental research of hydrogen storage mechanism with high-intensity total diffractometer
Principal Investigator: Toshiya Otomo

Brief summary of the proposal:

Hydrogen-storage materials play a fundamental role for utiliing hydrogen as a main energy source. For further technical innovation, it is essential to investigate physical and chemical state of hydrogen in materials. In particular, detection of H-H correlation using the high-intensity total diffractometer is highly required. This research proposal aims at evaluating the high-intensity total diffractometer at MLF-BL21 (NOVA) and conducting fundamental researches on mechanism of hydrogen storage.

Decision: A
Beam time allocation: (days/year) (β = 70%)
Approval and suggestion(s) to IMSS: budget and resources:

We recommend the IMSS to support financially as described in the proposal. It should be noted that no significant budget has been assigned so far to this research project. For this reason, the priority to this project should be high.

Comments:

Construction of the NOVA beamline has finished by receiving the budget from NEDO. Some publications already appeared from the NOVA beamline and the scientific activity of the research group is high. We strongly recommend to accept and support this proposal.

2011/12/27: Neutron Program Advisory Committee

Program ID: 2009S07
Title: Construction of advance neutron beam line for VIllage of Neutron Spin Echo spectrometers (VIN ROSE)

Principal Investigator: Masahiro Hino
Brief summary of the proposal:
New spin-echo-type spectrometers, MIEZE and NRSE (totally called as VIN-ROSE), have been originally developed by Kyoto University group. Their performances were already demonstrated using JRR-3M reactor source. This program (ID=2009S07) proposes to start the construction of their instruments on BL06 (J-PARC/MLF), in FY2012.

Decision: A
Beam time allocation: 200 (days/year) (β =100%) for construction and commissioning on BL06
Approval and suggestion(s) to IMSS: Requested budget and resources are reasonable and should be supported by IMSS.

Comments:

The MIEZE and the NRSE are innovative and progressive, and can open new scientific fields such as slow dynamics in polymers, bio-materials and magnetic materials. Their construction should be started very urgently.

In order to strive for early completion of their construction, it is expected that the applicant and KEK-neutron staffs should intensively discuss about year-plans for the budget-schedule and the upgrade-schedule for their instrument performance, and that much clear and sure year-plans should be drown up.

2011/12/27: Neutron Program Advisory Committee

Program ID: 2009S08
Title: Analysis of Dynamics at Nano Interface of Functional Soft Matter
Principal Investigator: Atsushi Takahara
Brief summary of the proposal:

Structural characterization of soft materials interfaces is an important subject in order to understand the origin of their physicochemical behaviors. Neutron reflectometry (NR) is one of the powerful tools to characterize the interfacial structure with nanometer order resolution. Although two downward neutron beams at 2.2 and 5.7 degree are transported at the BL16 beamline, only the neutron beam at 2.2 degree was available for ARISA-II. The S08 group installed a novel neutron reflectometer SOFIA (SOFt Interface Analyzer) with support of JST ERATO Takahara Soft Interfaces Project and KEK. SOFIA is able to receive both of those two downward beam lines by extension of the vertical strokes. The S08 group has demonstrated the validity of SOFIA using standard samples, and has done some preliminary applications to soft materials, *e.g.*, time resolved experiment as well as measurements at a liquid /soft materials interface. The S08 group will extend this SOFIA to the kinetic studies of interfacial structure evolution, adsorption of various surface active molecules at the interface, dynamic structure change of buried interfaces and response of interfacial structure upon external stimuli. Also, S08 group is trying to develop GI-SANS system, which utilize novel 2D-detector and strong beam intensity of J-PARC. The research group also has a plan to measure NR of free-liquid surfaces.

Decision: A
Beam time allocation: 100 (days/year) (β = 50%)
Approval and suggestion(s) to IMSS: budget and resources:

4 MJPY for travel expenses and 10 MJPY for general expenses

Comments:

It is highly evaluated in that number of publications is continuously increasing. Since a part of the S08 project is supported by the JST ERATO Takahara project, we recommend sufficient amount of beamtime is supplied to the project for fruitful results. If the research group reports excellent performance of soft interface characterization at

BL16, there is a possibility of extension of the ERATO project after 2014. The R & D work for GI-SANS option is expected to be priotized.

Separately, reflectivity measurements of free-liquid surfaces have not yet been carried out due to the security regulation reason. We recommend IMMS to do its effort to overcome this disadvantageous situation.

2011/12/27: Neutron Program Advisory Committee

Program ID: 2009S09
Title: Dynamic and Static Structural Analysis by 3D polariometry spectroscopy on Neutron Analysis System for Functional Material
Principal Investigator: Kenji Ohoyama

Brief summary of the proposal:

This project is aiming at constructing the first dedicate instrument for polarization analysis spectroscopy in J-PARC, which will be indispensable for making breakthrough in advance magnetic physics. Because of many R&D issues, this project will be progress by phased approach of studies/constructions; at first, we will realise polarization analysis spectroscopy with E_f<30meV using a suppermirror analyser. In 2011, we did mainly the following points by the supports of KEK(~80Milion JPY): (1) designs of structure of the shields (2) estimations of the shield performance, and (3) development of a dynamic proton filter system for high energy experiments. We are aiming at realizing basic beam experiments in 2013 by a stripped-down system. In 2012, we will advance the following project; (1) construction of the shields, (2) installation of guide tubes in the shutter and biological shield regions, (3) preparations of basic data taking system such as PSD, modules and so on. By this simple system, we will be able to investigate static structures of magnetic moments of ferromagnetic nano devices, dilute magnetic semiconductors and so on.

Decision: A
Beam time allocation: Neutron spectrometer is under construction.
Approval and suggestion(s) to IMSS: Budget and resources:
Budget should be support to a maximum extent.

Comments:

The principal investigator plan to construct the polarization analysis neutron spectrometer. For this purpose, they will develop the elementary neutron technologies, such as, correlation copper and dynamical proton spin filter. The final energy range of their spectrometer reaches 300 meV, which covers the spin wave in the metallic magnetic alloy system, for instance, Mn_3Si-Fe_3Si. These elementary technologies are quite

important for the future neutron science and also for magnetic devices. In this context, the proposal should be promoted with maximum priority.

2011/12/27: Neutron Program Advisory Committee

Program ID: 2009S10

Title: Structural study of batteries by using the special environment neutron powder diffractometer

Principal Investigator: Toshiharu Fukunaga

Brief summary of the proposal:

This program is a part of a NEDO project to develop innovative storage cells: the Research and Development Initiative for Scientific Innovation of New Generation Batteries (the RISING project). Batteries take important role in modern life such as mobile phone, mobile PCs, hybrid automobiles, and the storage of energy produced during night. After the crisis due to the earthquake, batteries are expected to take power supply in such cases. Lower production cost with higher performance is also required for the batteries. From the view point of global environment, it is important to develop batteries that give minimum environmental load during those life cycle; from mining to disposal.

Lithium ion batteries are often used and many reports have been published on the structure and redox process of transition elements used in batteries by using various probes such as synchrotron radiation. But it is not easy to study the status of lithium itself by using synchrotron radiation. This program aims to study the materials used in batteries under working conditions.

Decision: A

Beam time allocation: (days/year) (β = 100%)

Approval and suggestion(s) to IMSS: budget and resources:

1MJPY for travel expenses of graduate students

Comments:

Despite the serious damage by the East Japan earthquake, the beamline has been installed and the diffractometer is to be installed soon. Special chemistry laboratory with electrochemical equipments is also setting up now. The committee expects the progress of the commissioning and sees the strength of the beamline in near future. SPICA will become an important tool for the evaluation of newly developed batteries in near future. Thus automation of measurements under various conditions and development of data analyses tools will become important when many scientists who are not familiar to neutron

experiments.

2011/12/27 : Neutron Program Advisory Committee

Program ID: 2009S11
Title: Neutron Transmission Imaging
Principal Investigator: Yoshiaki Kiyanagi
Brief summary of the proposal:

The main targets of the proposal are the developments of an energy selective imaging method and also the development of detector devices and system for this method. This project also has a vision to popularize the neutron transmission imaging method including the development of compact neutron sources.

Decision: A
Beam time allocation: (days/year) (β= 0) No beam time is requested.
Approval and suggestion(s) to IMSS:

Needs for compact neutron sources and detectors suitable for these sources is increasing in pure science applications as well as industrial and clinical applications. In this proposal, establishing the method suitable for pulsed neutron transmission imaging is one of main subjects. There is no doubt that the this development will benefit researches in J-PARC. So it is appropriate to support this proposal as an S-type project.

budget and resources:

The requested budget for FY 2012 matches the proposed plan for the proposal.

Comments:

The development of compact neutron sources, which is another main subject of this research group, is an important for both Japanese neutron science and Japanese accelerator science. However, this goal of the development exceeds the range which can be covered by S-type project. Strong supports from KEK and IMSS should be considered.