PREFACE

In this twenty-first issue of the CYRIC Annual Report, we summarize the activities for research and development and results of training for radioisotope safe-treatment at Cyclotron and Radioisotope Center (CYRIC), Tohoku University during the calendar year 2000.

In order to realize the motto of Tohoku University, the principle of CYRIC, as a research and education institute to open it's facilities for common-use over university members, is to maintain K=12-MeV and 110-MeV AVF cyclotrons and related facilities, including positron emission tomography (PET) systems, as an important scientific infrastructure, and to carry out the role of the center of our university for safe-handling of radiation and radioisotopes. As such, we aim to support development of fundamental but promising researches and interdisciplinary ones together with promotion of the leaders in the fields of the nuclear science so as to answer the social demands.

The accelerator and related facilities together with building including radiation shields was inspected by the Nuclear Safety Division, Science and Technology Bureau, MEXT on 30 June, 2000. Then, official performance test of the new K=110MeV, 930 AVF cyclotron with beam acceleration has been carried out successfully. The research program committee has accepted new proposals, and scheduled the beam time over the coming three months in 2001.

Studies with PIXE (Particle Induced X-ray Emission) technique have been continuously performed by using electrostatic accelerator, installed at FNL (Fast Neutron Laboratory) in Graduate School of Technology, Tohoku University, under the scientific tie-up between CYRIC and FNL. Indeed, more than six groups are running under this project using a total of its 240 hours beam-time.

Synthesis of radiopharmaceuticals for clinical research with PET (Positron Emission Tomography) and other applications have been continuously carried out. The small size AVF cyclotron HM-12, installed under scientific and technical tie-up among IDAC, CYRIC and Sumitomo Heavy Industry Co. Ltd, has steadily been operated. Positron emitting radio-nuclides was provided with 300 hours exposure by 12-MeV proton beams, while those by 6-MeV deuteron beams were done with 264 hrs exposure. With a number of radiopharmaceuticals thus produced, 54 research programs are running covering almost all clinical research fields together with works for basic medical research with volunteers.

During 2000 school year, 539 of staff members and students of Tohoku University were trained at this Center in the beginner's course of safe handling of radiation and
radioisotopes, while 279 staff members and students in the "x-ray course". In addition, 60 of staff members and students were trained in the course of safe handling of radiation from a SOR (Synchrotron Orbital Radiation).

On November 10 and 11, 2000, a workshop was held to discuss the proposal presented for the studies with the new K=110 AVF cyclotron and related facilities. Followings are the program. We are indebted to the speakers.

*An advanced stage of nuclear medicine by PET with newly developed heavier positron emitting nuclide: by R. Iwata and K. Yamaguchi (CYRIC)

*Mechanism of high-energy ion atom collision and its application:
by K. Ishii (Graduate School of Technology)

*Assessment of atomic reactor materials, and development of maintenance and integrity techniques for them: by A. Hasegawa (Graduate School of Technology)

*Development of neutron fields and measurement of neutron cross sections:
by M. Baba (CYRIC)

*Nuclear physics by proton-rich unstable nuclear-beams: Search for the ground state of $^{16}$N by the $p(^{10}$C,n)$^{16}$N reaction: by H. Ohtsu (Graduate School of Science)

*Production of high-energy gamma-ray and $\pi$- and $\eta$-mesons by coherent nucleons-nucleons collision: by J. Kasagi (Graduate School of Science)

*Study of nuclear structure and astro-nuclear physics by means of gamma-ray spectroscopy: by Y. Gono (Kyushu University)

*Production of polarized nuclei and measurement of electromagnetic moments of unstable nuclei by RI-beam:
by M. Tanigaki (Kyoto University) and S. Ohya (Niigata University)

*Development of low-energy polarized RI-beam production: by K. Asahi (RIKEN)

*Nuclear chemistry of super-heavy nuclei: H. Kudo (Niigata University)

*Study of spin-isospin excitation in nuclei and nucleon-nucleus optical-potential in <100MeV region: by A. Terakawa and H. Orihara (CYRIC)

*Synthesis of heavy elements and their decay and chemical properties:
T. Ohstuki ((Graduate School of Science)

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Hikonojo ORIHARA
Director
Cyclotron and Radioisotope Center, Tohoku University