PREFACE

The readers of RIKEN Accelerator Progress Report (APR) must have realized that we have stopped sending you a thick volume of papers. Instead, you now receive a compilation of the gravure and the highlights of the year with information of a web page where you can download a full set of the articles. While such change has been made to adapt to the changing times, it may make the readers of the older generation miss the good old times.

Nevertheless, when you pick up a thin booklet of the latest APR, please look into one of the highlights, "RI beam production at BigRIPS in 2014" written by N. Fukuda and his coauthors. From the impressive nuclear chart showing the history of RI beam production, you will learn that from March 2007 to December 2014, 140 new isotopes were discovered at BigRIPS, and that the production yields were measured for more than 1,000 isotopes. A total of 89 experiments have been performed so far. The Nishina Center is proud of these accomplishments and all the members who have contributed to this remarkable achievement must be applauded.

According to the BigRIPS compilation, the most popular primary beam is without a doubt uranium-238, and the close second is calcium-48. Containing 20 protons and 28 neutrons, calcium-48 is the so-called doubly magic nucleus. It is very neutron rich but its life time is 43 quintillion (10^{18}) years, much longer than the life of the universe (14 billion years). This is why there still exists natural calcium-48, but since its quantity totals only 0.18% of all the calcium, it is very expensive. Calcium-48 is our key tool to study the nuclear region called "island of inversion" and to find out where a neutron drip line for fluorine (F), neon (Ne), sodium (Na) *etc*. is. In 2014, our Ion Source Team succeeded in the calcium-48 ion production which is highly budget-friendly. As highlighted in this volume of APR as "Supply of 48Ca beam from 18-GHz ECRIS using the micro-oven" by K. Ozeki and his coauthors, the consumption of calcium-48 has been reduced by nearly a factor of 10 and the stability of the ion source has much improved. One should acknowledge that such behind the scene effort is essential for our beam performance.

Other important subject which became quite visible at the RIKEN RI Beam Factory in 2014 is nuclear chemistry. With the third event of element 113 observed in the summer of 2012, the search for 113th element was concluded which propelled us to take the next step forward, i.e. to begin search for element 119 and 120. With this shift, a long-waited research for nuclear chemistry of super-heavy elements came into full swing. There are two outstanding reports in this APR, "First chemical synthesis and investigation of $Sg(CO)_6$" by J. Even *et al*. and "Results of first online tests of small ion-surfing RF carpet gas cell at GARIS-II" by P. Schury *et al*.. The former determined that seaborgium belongs to the 6th family chemically, and the latter revealed the powerful potential of GARIS-II in its application to super heavy element chemistry when combined with the RF carpet technology developed to slow RIs down for high precision measurements. I believe super heavy chemistry has moved into an unexplored new stage of research.

The year 2014 was the landmark year for the Nishina Center in that it made a shift toward a new direction in response to the needs of today's society. We have started two governmental projects, ImPACT (Impulsing Paradigm Change through Disruptive Technologies) program titled "Reduction and Resource Recycle of High Level Radioactive Wastes with Nuclear Transmutation" and SIP (Strategic Innovation Promotion) program titled "Technology for creating next-generation forestry, agriculture and fisheries", both of which are based on our long time bottom-up efforts and activities. By initiating these governmental projects, we have declared to the society that we will give back to the community our research results.

In spite of such impressive progress made in the Nishina Center however, it was truly unfortunate that the entire JFY2014 had to be spent on complying with RIKEN's countermeasures against the STAP incident, a serious scientific misconduct that occurred at the RIKEN Center for Developmental Biology. I apologize for any inconveniences you have had to deal with. I must, however, repeat once again what I had wrote in the preface of APR2013. If any similar incident ever occurred at the Nishina Center, the Center would cease to exist. We thus declare that we will never let such an incident happen in our field.

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