Nishinaka[2], M. Hirata[2], T. Yaita[2], S. Ichikawa[2], Y. Nagame[2], A. Shinohara[3], S. Goto[4], T. Kaneko[4], H. Kudo[4], Y. Oura[5], H. Nakahara[5], K. Sueki[6], A. Yokoyama[7], M. Sakama[8], M.Schädel[9], and J. V. Kratz[10], [1]RIKEN, Cyclotron Center, Wako, Saitama 351-0198, Japan, [2]Advanced Science Research Center, Japan Atomic Energy Research Institute, Tokai, Ibaraki 319-1195, Japan, [3]Graduate School of Science, Osaka University, Toyonaka, Osaka 560-0043, Japan, [4]Department of Chemistry, Niigata University, Niigata, Niigata 950-2181, Japan, [5]Graduate School of Science, Tokyo Metropolitan University, Hachioji, Tokyo 192-0397, Japan, [6]Department of Chemistry, Tsukuba University, Tsukuba 305-8571, Japan, [7]Department of Chemistry, Kanazawa University, Kanazawa, Ishikawa 920-1192, Japan, [8]School of Health Sciences, University of Tokushima, Tokushima, Tokushima 770-8509, Japan, [9]Gesellschaft für Schwerionenforschung, D-64291 Darmstadt, Germany, [10]Institut für Kernchemie, Universität Mainz, D-55099 Mainz, Germany

Chemical properties of element 104, rutherfordium (Rf), have been investigated together with those of the group-4 elements Zr and Hf by an anion-exchange chromatography at an atom-at-a-time scale. The isotopes ^{261}Rf, ^{85}Zr, and ^{169}Hf were produced in the ^{248}Cm(^{18}O,5*n*), ^{nat}Ge(^{18}O,*xn*), and ^{nat}Gd(^{18}O,*xn*) reactions, respectively, at the JAERI tandem facility. Their on-line anion exchange separations were performed in the 4.0–11.5 M HCl, 1.9–13.9 M HF, and 8.0 M HNO_3 solutions using the Automated Ion exchange separation apparatus coupled with the Detection system for Alpha spectroscopy (AIDA). It was found that the sorption behavior of Rf in the HCl and HNO_3 systems is very similar to that of Zr and Hf, indicating that Rf is typically the member of the group-4 elements. On the other hand, a notable difference in the sorption behavior between Rf and its homologues Zr and Hf was found in the HF system. In the conference, the complex formation of Rf will be discussed by referring to the structural analyses of the X-ray Absorption Fine Structure (XAFS) spectra of Zr and Hf solutions and also to the relativistic density functional calculations of Rf, Zr, and Hf complexes.

344 NEUTRON ACTIVATION ANALYSIS OF ABSOLUTELY-DATED TREE RINGS. K. Ünlü[1*], P. I. Kuniholm[2], J. J. Chiment[2], D. K. Hauck[1]. [1]Radiation Science and Engineering Center, The Pennsylvania State University, University Park, PA 16802 USA, [2]The Malcolm and Carolyn Wiener Laboratory for Aegean and Near Eastern Dendrochronology, Cornell University, Ithaca, NY 14853 USA.

Uptake of metal ions by plant roots is a function of the type and concentration of metal in the soil, the nutrient biochemistry of the plant, and the immediate environment of the root. Uptake of gold (Au) is known to be sensitive to soil pH for many species. Soil acidification due to acid precipitation following volcanic eruptions can dramatically increase uptake by trees. Identification of high content in tree rings in dendrochronologically-dated, overlapping sequences of trees allows the identification of temporally-conscribed, volcanically-influenced periods of environmental change. Ion uptake, specifically determination of trace amounts of Au using neutron activation analysis (NAA) is performed for dendrochronologically-dated wood samples. The concentration of Au will be correlated with known environmental changes, e.g. volcanic activities, during historic periods. Several thousand wood samples will be scanned initially for Au. After this initial measurement, samples containing elevated levels of Au will be analyzed again for short and long half-life elements to investigate other elemental signatures of environmental change. The Malcolm and Carolyn Wiener Laboratory for Aegean and Near Eastern Dendrochronology in Cornell's Department of the History of Art and Archaeology has archived more than 30,000 individually dated wood samples with 4.5 millions rings from forests in the eastern Mediterranean and former Soviet Union countries. The dates of these samples range from 7000 BC up to present. Initial data presented in this paper are from a single tree that grew in Turkey from 1411 until 1988. Using NAA, trace amounts of Au were measured with ppb level sensitivity in this tree's individual rings for this period.

345 SURVEY OF THE TEACHING AND APPLICATIONS IN RADIOCHEMISTRY IN LATIN AMERICAN COUNTRIES. M.B.A. Vasconcellos*, M. Saiki. IPEN/CNEN-SP-Brazilian Nuclear Energy Commission, Caixa Postal 11049, CEP 05422-970, São Paulo/SP BRAZIL.

By initiative of the International Atomic Energy Agency, a Technical Meeting was held in Antalya, Turkey, (10-14 June 2002), in order to discuss the situation of the teaching and applications in Radiochemistry in Africa, Asia, Europe, Latin America and in the United States. The concern of the IAEA is due to the fact that previous studies have shown that a gradual decrease of teaching and training opportunities in Radiochemistry has been occurring in Europe and in the United States since more than two decades. In this paper, a description is made of the survey that was undertaken, for the first time, about the situation of Radiochemistry activities in the Region of Latin America, comprising twenty countries from South America, Central America and the Caribbean. It became clear from this study that very strong differences exist between the countries and that most of the nuclear facilities in operation, such as nuclear reactors, hot cells, radiochemical laboratories and cyclotrons are concentrated in six countries, accompanied by research and educational activities. A detailed study of the situation and trends in the Latin American countries is presented, as regards teaching and other activities related to Radiochemistry, as well as a series of suggestions for preservation of knowledge in the field.

346 RECENT DEVELOPMENTS IN SEMICONDUCTOR GAMMA-RAY DETECTORS. P. N. Luke[1], M. Amman[1], C. S. Tindall[1]. [1]Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA.

The successful development of lithium-drifted Ge detectors in the 1960's has revolutionized the field of gamma-ray spectroscopy. In the 1970's, high-purity Ge became available, which eased detector fabrication and enabled the production of complex detectors and multi-detector systems. In the following decades, the technology of semiconductor gamma-ray detectors continued to advance, with significant developments not only in Ge detectors but also in Si detectors and room-temperature compound-semiconductor detectors. Our group at Lawrence Berkeley National Laboratory has been actively engaged in the development of semiconductor radiation detectors since the early days of lithium-drifted Ge detectors, and has developed technologies to ease the fabrication of complex detectors and to improve detector performance. In recent years, we have worked on a variety of gamma ray detectors based on different materials. Examples include fine-pitched Ge strip and pixel detectors, coplanar-grid CdZnTe detectors, and orthogonal-strip lithium-drifted Si detectors. These advances provide new capabilities in the measurement of gamma rays, such as the ability to perform imaging and the realization of highly portable spectroscopic systems. An overview of these developments is presented.

347 ATMOSPHERIC MONITORING OF ANTHROPOGENIC NUCLIDES IN MELBOURNE, AUSTRALIA. R.A. Tinker[1], R. O'Brien[1], M. B. Cooper[*2], [1]Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), Environmental & Radiation Health Branch, Yallambie, Victoria, AUSTRALIA, [2]Envirorad Services Pty Ltd, Beaumaris, Victoria, AUSTRALIA.

The atmospheric radionuclide monitoring station has been continuously sampling at ARPANSA in Melbourne, Australia, since September 2000 as part of the verification system of the Comprehensive Nuclear-Test-Ban Treaty (CTBT). The monitoring station consists of a high volume sampler capable of sampling approximately 20,000 cubic metres of air in 24 hours. The air filters are analysed by high-resolution gamma-ray spectroscopy with the resulting gamma-ray spectra enabling quantitative determination of atmospheric radionuclides. The station has proved to be capable of detecting anthropogenic radionuclides with a very high degree of sensitivity, for example, I-131 concentrations down to 1-2 $\mu Bq.m^{-3}$. Although in the two years of operation, the station normally measures only naturally-occurring airborne radionuclides, there has been the occasional detection of fission products attributable to the use of medical isotopes in Melbourne. In a recent occurrence, several anthropogenic nuclides, namely, I-131, Tc-99m, Au-198 and I-124, were detected in one daily sample. It is likely that these radionuclides do not originate from the same source and the process to determine their likely origins is described in this paper. Also discussed are the implications of the presence of these types of fission products and other anthropogenic radionuclides on