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EDITORIAL

Dear reader,

It is a great pleasure to provide you the second issue of Atom Indonesia in 2020, namely Vol. 46 No. 2 (2020). Since SCOPUS and Web of Science (WOS) indexed Atom Indonesia, the number of articles submitted to Atom Indonesia has significantly increased. To retain the quality of the publications, all articles submitted to Atom Indonesia are peer reviewed by qualified editors and reviewers and is supported by a professional administration team.

The Atom Indonesia Vol. 46 No. 2 (2020) contains eight articles discussing various aspects and applications of nuclear science and technology. The contributors of those articles are not only from various national institutions and universities, but also from international institutions.

"Radiolabeling Technique of Silver Nanoparticles (AgNPs) with Iodine-131 Radionuclide" was written by U.N. Sholikhah, E. Sarmini, Sriyono and T. Widyaningrum from Center for Radioisotopes and Radiopharmaceutical Technology, National Nuclear Energy Agency (BATAN), Serpong, Tangerang Selatan, Indonesia, under collaboration with R.R. Syahdi and S.E. Permatasari from Department of Pharmacy, University of Indonesia, Depok, Indonesia. Radiotherapy is an effective cancer therapy, where a certain dose of radiation is aimed specifically at target and is unaffecting to normal tissue. A selective radionuclide must be attached to the specific targeted organ. In this research, silver nanoparticles (AgNPs) were labeled with radionuclide of iodine-131 (^{131}I) to be used in the radiotherapy. Silver nanoparticles were synthesized using silver nitrate 0.0005 M, sodium borohydride 0.002 M, polyvinylpyrrolidone 0.3 % (w/v) and natrium chloride 1.5 M, and then followed by purification by centrifugation. Characterization was carried out with UV-Vis spectrophotometer, transmission electron microscope, particle size analyzer, and zeta-sizer. The results show that the method is suitable for radiolabeling AgNPs with ^{131}I to be used for radiotherapy.

"Construction and Evaluation of a Multipurpose Performance Check Phantom for Computed Tomography" was explored by L.E. Lubis, T. Mart and D.S. Soejoko from Department of Physics, Faculty of Mathematics and Natural Sciences, Universitas Indonesia, Depok, Indonesia, under collaboration with I. Hariyati from Radiology Department, Gading Pluit Hospital, Jakarta, Indonesia, D. Ryangga from Radiotherapy Department, Regional General Hospital, Ps. Minggu, Jakarta, Indonesia, and I.A.S. Mu'minah from Center for Medical Physics and Biophysics, Institute of Applied Sciences, Faculty of Mathematics and Natural Sciences, Universitas Indonesia, Depok, Indonesia. The use of computed tomography (CT) has become a common practice in medical diagnosis in Indonesia. Its number, however, is not matched by the availability of dedicated-performance-check phantoms. This paper aims to describe the design, construction, and evaluation of an in-house phantom for CT performance check that accommodates both radiation dose measurement and image quality performance checks. The phantom is designed as laser-cut polymethyl methacrylate (PMMA) slabs glued together to form a standard cylindrical shape, with spaces to place dose measurement and image quality modules. In this paper, measurement results on both aspects are discussed and compared with standard phantoms and other works.

"Comparison of Gamma Index Passing Rate in Several Treatment Planning System Algorithms" was explored by S. Liura from Department of Radiotherapy, MRCCC Siloam Hospitals, Jakarta, Indonesia under collaboration with S.A. Pawiro from Department of Physics, Faculty of Mathematics and Natural Sciences, University of Indonesia, Depok, Indonesia. The verification of dose calculation algorithm in a new Treatment Planning System (TPS) can be evaluated by comparing the passing rate of the gamma index analysis of the evaluated algorithm and the clinically implemented algorithms. In the present investigation, the gamma index passing rates was investigated as the reference data in the verification of the new three-dimensional TPS. The algorithms, which are used in this study, are Pencil Beam Convolution (PBC) version 11.0.31 and Anisotropic Analytical Algorithm (AAA) version 11.0.31 in Eclipse v.11 TPS, and Fast

Convolution (FC), Adaptive Convolution (AC), and Collapsed-Cone Convolution (CCC) in Pinnacle^3 v.7.6c TPS.

"Characteristics of Stable Isotope Compositions ($\delta^{18}O$ and $\delta^{2}H$) of Surface Water in Bengkulu City" was written by B.N. Zega and A.M. Lubis from Department of Physics, University of Bengkulu, Bengkulu, Indonesia, under collaboration with S. He from Earth of Observatory of Singapore, Nanyang Technological University, Singapore. Indonesia as an archipelagic country has a unique location and topography, and the El Niño-Southern Oscillation (ENSO) is observed in this region, resulting in complex weather and climate variability. As a result, Indonesia including Bengkulu experiences regular natural disasters. Stable isotopes ($\delta^{18}O$ and $\delta^{2}H$) have been used as natural tracers in solving water resources and water-related problems. The aim of this research is to investigate the variations of stable isotopes in Bengkulu City from three locations, namely Serut and Hitam Rivers and the Universitas Bengkulu (UNIB) lake, and to understand the hydrological processes in Bengkulu City. In this research, samples of surface water from Serut and Hitam Rivers and UNIB Lake in Bengkulu City were collected over five months between December 2018 and April 2019. Stable isotope compositions of these water samples were, then, examined to understand the local hydrological processes.

"Molybdenum-99 (^{99}Mo) Adsorption Profile of Zirconia-Based Materials for $^{99}Mo/^{99m}Tc$ Generator Application" was written by Marlina, E. Lestari, Abidin, Hambali, S. Febriana, Kadarisman, R. Awaludin from Center for Radioisotopes and Radiopharmaceutical Technology, National Nuclear Energy Agency (BATAN), Serpong, Tangerang Selatan, Indonesia, under collaboration with I. Saptiama from Faculty of Medicine, University of Tsukuba, Ibaraki, Japan, M. Tanase from Oarai Research Center, Chiyoda Technol Corporation, Oarai, Ibaraki, Japan, K. Nishikata and K. Tsuchiya from Oarai Research and Development Institute, Japan Atomic Energy Agency, Oarai, Ibaraki, Japan. Technetium-99m (^{99m}Tc) plays a major role in diagnostic nuclear medicine and has not yet been replaced with any other radionuclides. It is available through the $^{99}Mo/^{99m}Tc$ generator. The use of low-specific-activity ^{99}Mo for $^{99}Mo/^{99m}Tc$ generator application requires high adsorptive capacity sorbents. This study focused on the determination of ^{99}Mo adsorption capacity of several zirconia materials, namely monoclinic nanozirconia, orthorhombic nanozirconia, sulfated zirconia, and phosphated zirconia. These materials were synthesized by using the sol-gel method and characterized using FT-IR spectroscopy, X-ray diffraction (XRD), and scanning electron microscopy/energy-dispersive X-ray spectroscopy (SEM-EDS).

"Natural Radionuclides Determination and Radiological Hazard Assessments in Soil from Tual and Kei Islands, Indonesia" was explored by Syarbaini from Center for Radioisotopes and Radiopharmaceutical Technology, National Nuclear Energy Agency (BATAN), Serpong, Tangerang Selatan, Indonesia under collaboration with Kusdiana and M. Wiyono from Center for Radiation Safety Technology and Metrology, National Nuclear Energy Agency (BATAN), Jakarta, Indonesia, and D. Iskandar from Center for Radioactive Waste Technology, National Nuclear Energy Agency (BATAN), Serpong, Tangerang Selatan, Indonesia. Natural radionuclides ^{226}Ra, ^{232}Th and ^{40}K in soil are the primary components of the background exposure sources of the population. Study of the external exposure due to gamma-ray radiation of natural radionuclides is important because this may contribute significantly to the total annual individual dose. The purpose of this study is to investigate the natural radionuclides in soils collected from Tual and Kei islands and assess the radiological hazard due to natural radionuclides contents in soil. The soil samples were analyzed for natural radionuclides ^{226}Ra, ^{232}Th and ^{40}K using gamma ray spectrometry. Radiological hazard parameters were estimated from the activity concentration of these radionuclides in order to assess health implication of exposure of the general public.

"Characterization of Fe-Chitosan-Succinate-NN'-Methylene Bis-Acrylamide as Ion Imprinted Polymer" was written by M. Suhartini and S. Prayitno from Center for Isotopes and Radiation Application, National Nuclear Energy Agency (BATAN), Jakarta, Indonesia, under collaboration with S. Anwar and A. Saefumillah from FMIPA, University of Indonesia, Depok, Indonesia, and Sudirman from Center for Science Technology of Advanced Materials, National Nuclear Energy Agency (BATAN), Serpong, Tangerang Selatan, Indonesia. High level of phosphate in the aquatic environment can reduce the amount of dissolved oxygen in the water, which is harmful to the preservation of aquatic ecosystems. However, ion-imprinted polymer (IIP) is available to adsorb tripolyphosphate (TPP). In this study, Fe (III)-chitosan-succinate-tripolyphosphate complex was synthesized with NN'-Methylene Bis-Acrylamide (MBA) as a crosslinking

agent and gamma-ray as reaction initiator. The aim of the study is to observe the physical and chemical characteristics of radiation-induced crosslinking of IIP in the present of MBA.

"Assessment of Levels of Occupational Exposure to UV-A and UV-C Radiation among Shielded Metal Arc Welders in Accra, Ghana" was written by A. Sawyerr from Institute of Scientific and Technology Information (INSTI) - Council for Scientific and Industrial Research (CSIR), J.J. Fletcher from University for Development Studies, Navrongo, Ghana, J. Amoako from Health Physics and Instrumentation Centre, Radiation Protection Institute, Ghana Atomic Energy Commission, Ghana, and E. Sosu from Medical Radiation Physics Centre (MRPC), Radiological and Medical Sciences Research Institute, Ghana Atomic Energy Commission, Ghana. This study attempted to quantify the irradiance levels of ultraviolet A (UV-A) and ultraviolet C (UV-C) from the shielded metal arc welding (SMAW) process to welders in Accra, Ghana. Exposures were assessed via measurements, observations, and interviews. The assessments were done based on safe exposure levels prescribed by recognized international organizations such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and the American Conference of Governmental Industrial Hygienists (ACGIH). It was found that the total exposure time of the welders exceeded the permissible exposure durations and that the safety practices among the welders were unsatisfactory.

On behalf of Atom Indonesia, I would like to thank you all for your contributions and endless support that have allowed Atom Indonesia to reach an outstanding performance for all the years. This outstanding achievement could not have been reached without great efforts and cooperation from the editors, reviewers, management personnel, authors, and readers.

Editor in Chief