Accreditation No.: 30/E/KPT/2018

atom indonesia

Exist for publishing the results of research and development in nuclear science and technology

Publisher : Center for Informatics and Nuclear Strategic Zone Utilization
Mailing Address : National Nuclear Energy Agency
Puspiptek Serpong, Tangerang 15314, Indonesia
Phone (+62 21) 7560575, 7562860 ext. 9017, Fax (021) 7560895
Web: http://aij.batan.go.id, E-mail : atomindonesia@batan.go.id

Licences : SIT No. 078/Khs/Dit.PP/II. 1a & 75; 24.5.75,
SIC No. B/289-PK/VI/75; 3.6.75

Accreditation No.: 30/E/KPT/2018

atom indonesia
vol. 46 no. 1
April 2020

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EDITORIAL

Dear reader,

It is a great pleasure to provide you the first issue of Atom Indonesia in 2020, namely Vol. 46 No. 1 (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. 1 (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.

"Voice Classification Based on Fast Independent Component Analysis to Support Nuclear Power Plant Security" was written by Rizki Firmansyah Setya Budi and Suparman from the Center for Assessment of Nuclear Energy System –National Nuclear Energy Agency of Indonesia, Jakarta, Indonesia. National vital objects require special protection because they have important role in national development. Nuclear power plant (NPP) is one of them. Access restriction is required to prevent the NPP from potential hazards to enhance the security. This research has implemented pattern recognition and classification of voice passwords to restrict access to the NPP. The passwords were a, i, u, e, and o. The features vector was searched by using Fast ICA method while the pattern classification was performed by minimum Euclidean method. The results show that Fast ICA and minimum Euclidean methods can 100% distinguish between the employees who have access permit and those who have no access permit.

"Ordered Structure Analysis of Prepared Mesoporous Silica Using Small Angle X-Ray Scattering" was explored by A.I.W.S. Ramadani, N.S. Pamungkas, N.A. Putrisetya, M.C. Prihatiningsih and E.G.R. Putra from Polytechnic Institute of Nuclear Technology, National Nuclear Energy Agency (BATAN), Yogyakarta, under collaboration with M.D. Permatasari, A.A. Nugroho, S. Suyanta from Department of Chemistry, University of Gadjah Mada, Yogyakarta, Indonesia, A. Patriati from Center for Science and Technology of Advanced Materials, National Nuclear Energy Agency (BATAN), Kawasan Puspiptek Serpong,Tangerang, Indonesia and S. Soontaranon from Synchrotron Light Research Institute (SLRI), Nakhon Ratchasima, Thailand. Ordered pores structure analysis of mesoporous silica materials using a template of poly(ethylene oxyde)-poly(propylene oxide)-poly(ethylene oxide), PEO-PPO-PEO, triblock copolymer or Pluronics in numerous synthesis conditions has been conducted. Two different length of hydrophilic chain of Pluronics, i.e., P123 ($EO_{20}PO_{70}EO_{20}$) and F127 ($EO_{106}PO_{70}EO_{106}$), produced two different fine pore structures, which were basically hexagonal and cubic. A highly ordered pore structure, confirming with many Bragg peaks, was clearly obtained with the lattice parameters in nanometer scale from analyzing the synchrotron small angle X-ray scattering (SAXS) data. The SAXS patterns show that the pore order increases with increasing concentration of sodium silicate and decreases with longer sonication time.

"Radiomitigative Effects of Approved Hematopoietic Drugs on Mice Exposed to Lethal Total-body Irradiation" was explored by T. Nishida, M. Yamaguchi, S. Miura, K. Waga, N. Kawabata, and I. Kashiwakura from Hirosaki University, Department of Radiation Science, Hirosaki University Graduate School of Health Science, Japan under collaboration with M. Syaifudin from the Center for Radiation Safety Technology and Metrology, National Nuclear Energy Agency, Jakarta, Indonesia. In cases of radiological accidents, especially for victims exposed to high-dose total-body irradiation (TBI), the administration of appropriate approved hematopoietic drugs is the most rapid medical treatment for preventing severe acute radiation syndrome, which is associated with a high mortality rate. However, at present, there are few

suitable pharmaceutical drugs available in Japan, aside from granulocyte colony-stimulating factor (G-CSF). Depending on the situation surrounding the accident, various drug treatment options and the development of effective drug therapies may be required. The aim of the study is to assess various combinations of seven commercially available drugs—G-CSF, erythropoietin (EPO), romiplostim (RP), ancer (AN), cepharanthine (CE), leucon (LC) and leukoprol (LP)—in mice exposed to a lethal dose of 7 or 8 Gy of X-ray irradiation. The study concluded that as long as the threat of nuclear disaster exists, diverse efforts in the field of radiation emergency medicine, including the development of effective drug therapies, will be necessary.

"Sediment Accumulation Rate in Sayung Coast, Demak, Central Java Using Unsupported ^{210}Pb Isotope" was explored by W. A. Gemilang and U. J. Wisha from Research Institute of Coastal Resources and Vulnerability, Ministry of Marine Affairs and Fisheries, Jakarta Pusat, Indonesia, under collaboration with T. Solihuddin from Marine Research Center, Ministry of Marine Affairs and Fisheries, Jakarta Pusat, Indonesia and A. Arman from the Center for Isotopes and Radiation Application, National Nuclear Energy Agency of Indonesia. Some efforts have been done to cope with coastal erosion and rob in Sayung Coast including mangrove plantation, hybrid engineering (HE), and hard structure protection. However, those efforts are not considered to be the best solution in reducing the impacts of the hazards. This study aimed to determine the sediment accumulation rates based on natural isotopes 210Pb dating and hydro-oceanographic modeling technique. The study found that the increase of sedimentary rate recent years became an evidence that mitigation efforts to reduce abrasion were temporarily succeeded.

"Safety Analysis of the TRIGA 2000 U_3Si_2-Al Fuel Core Under Reactivity Insertion Accidents" was explored by Surian Pinem and Tukiran Surbakti from the Center for Nuclear Reactor Technology and Safety, National Nuclear Energy Agency, Serpong, Tangerang Selatan, Indonesia in collaboration with Peng Hong Liem from Cooperative Major in Nuclear Energy, Graduate School of Engineering, Tokyo City University (TCU), Japan, and Scientific Computational Division, Nippon Advanced Information Service (NAIS Co., Inc.), Tokaimura, Ibaraki, Japan. The TRIGA 2000 reactor in Bandung is planned to change its fuel type from the TRIGA fuel rod type to the U_3Si_2-Al plate type of low enriched uranium of 19.75% with uranium density of 2.96 gU/cc. A study on the neutronic parameters from the equilibrium core has been done. To ensure safe operation of the new fuel, thermodynamic evaluation of the core needs to be done. The purpose of this study is to conduct a reactor safety analysis of reactivity insertion during withdrawal of the control rod and to study the effect of this reactivity insertion on the power and the maximum temperature of the fuel and the cladding. Reactivity insertion accident is the main factor of the design basis accidents in nuclear reactor design. The study concluded that the maximum temperature of the coolant, the cladding, and the fuel for TRIGA 2000 core does not exceed the allowable safety limit for reactivity insertions.

"Comparison of ^{192}Os(p,n)^{192}Ir and ^{192}Os(d,2n)^{192}Ir Nuclear Reactions for ^{192}Ir Production" was explored by *M. Rezki, F. Arianto and E. Hidayanto from* Departement of Physics, Faculty Sciences and Matematics, Diponegoro University, Indonesia *under collaboration with I. Kambali from* Center for Accelerator Science and Technology, National Nuclear Energy Agency, Yogyakarta, Indonesia. Iridium-192 (^{192}Ir) is a radionuclide currently suggested for brachyteraphy. One of the methods employed to produce high purity ^{192}Ir is by irradiation of Osmium-192 (^{192}Os) target using cyclotron. The success of ^{192}Ir radionuclide production in cyclotrons requires deep understanding of irradiation parameters, including particle energy, target preparation and thickness, particle beam curent and irradiation time. Therefore, theoretical calculations of the ^{192}Ir radioactivity yields should be carried out as a preliminary measure for more efficient ^{192}Ir production. In this study, ^{192}Ir production was simulated using the SRIM 2013 program to determine the optimum target thickness while the nuclearcross-section data were extracted from TENDL 2017.

"Effect of Ion Irradiation on the Mechanical Properties of High and Low Copper" was written by Hiwa Mohammad Qadr from Department of Physics, College of Science, University of Raparin, Sulaimanyah, Iraqi Kurdistan, Iraq. An investigation into the effects of proton beam exposure on high- and

low-copper structural materials for nuclear reactors has been carried out. The aim of this work was to investigate the impact of proton energy irradiation on the damage of the materials. The damage parameter used in the evaluation was displacement per atom (dpa) in material as a function of proton energy. In addition, a TRIM code was used to identify the penetration depth in response to changes in proton energy. The study found that the hardness test for the high copper was higher than the low copper.

"Effect of Garlic, Stinky Bean, Dogfruit, Tomato Extracts, and N-acetylcysteine on Rats after 5 Gy Irradiation" was explored by T. Kisnanto – Master Programme in Biomedical Sciences, Faculty of Medicine, Universitas Indonesia and the Center for Radiation Safety Technology and Metrology, National Nuclear Energy Agency, Jakarta, Indonesia, in collaboration with I. Kurnia from the Center for Radiation Safety Technology and Metrology, National Nuclear Energy Agency, Jakarta, Indonesia and M. Sadikin from Center of Hypoxia & Oxidative Stress Studies, Faculty of Medicine, Jakarta, Indonesia. The formation of reactive oxygen species (ROS) and free radicals is the most important effect of radiation exposure on biological systems. Several studies have shown that several vegetables are proven to have beneficial effects to protect the body from free radical attacks. This current study was focused on exploring the capability of extracts of garlic, stinky bean, dog fruit, and tomato, as well as N-acetylcystein (NAC), in counteracting free radicals induced by gamma irradiation with a dose of 5 Gy. The results showed that gamma irradiation with a dose of 5 Gy caused increases in the level of MDA, 8-OHdG, and γ-H2AX foci while decreases were recorded in the level of GSH, GPx, and CAT ($p < 0.05$).

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