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Advanced Material Research for Energy and Health Application in BATAN, Indonesia

Indonesia as one of the G20 members has shown its commitment on Science and Technology development, especially on the Innovative Research towards the industrial application. To bridge the gap, the Indonesian Government through the Ministry of Research and Technology since 2008 has launched an annual program of 100 Indonesian Innovators of the year. The government has also a plan to form a National Innovation System (SIN). As for the National Research Agenda, the priority programs are in Agriculture, Energy, Information Technology, Transportation, Defense, Health and Development of Advanced Materials. The National Nuclear Energy Agency (BATAN) is led by a Chairman and its program is under the coordination of the Minister for Research and Technology. The main duties of BATAN are to conduct research, development and the beneficial applications of nuclear science and technology in accordance with the laws and regulations. BATAN program is designed based on Strategic Planning for short term, middle term, and long term. Some of the indicator of the achievement of success for example in Health/drugs based on Nuclear Technology Devices for preventing and releasing of cancer and bacterial infection. Since nuclear energy become an option for long term planning of Energy National System, BATAN becomes a Science and Technology Base (STB) on Nuclear Energy. However, the contribution of BATAN is not only in the nuclear science and technology, but also in other fields, such as research and development of advanced materials for application in renewable energy sources, health and environment.

Technology Center for Nuclear Industry Materials (PTBIN) is one of the centers of competences at BATAN for developing new materials for alternative energy and health. The research on electrode and electrolyte materials for Lithium battery components, has generated wide spread interest in this system as the power source with a variety of applications, including RFID. The choice of all-solid-state system to fabricate micro battery is excellent and attracting a lot of attention in the US and Europe recently. The all-solid-state batteries have a lot of benefit to offer including safety, long life, amenability for integration with solar cells and electronics. The research has been funded by the International Joint Research Program (RUTI) from the Ministry Research and Technology. The program has brought out the Indonesian research activities into the International forum, which is the key for bridging the science and technology in developing country with the Asian-Europe community. Other international activities have been shown by promoting the science into the international joint experiments at the neutron world class laboratory, such as ISIS, UK; ANSTO, Australia; KEK and JPARC; Japan; BENSC, Germany, and many other laboratories/ universities worldwide. Another research of excellent in PTBIN is a development of nano magnetic materials for diagnostic, such as the development of MRI contrast agent based on iron oxide nano particle and separation system for HPV. Sofar, this nanoparticle has been pre-clinically tested for MRI contrast agent application at BATAN. This research has become one of the national priority programs. The center is not only facilitated by different laboratories, equipped by different instruments for material characterizations (XRD, HRSEM/EDS, DTA/DSC, VSM, etc), but also has a neutron scattering facilities with several instruments (HRPD, SANS, HRSANS, FCD/TD, PD, Radiography). The most important results in those areas of application will be described in this paper.

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