Science, Technology and ICT Newsletter (NO.79)

Korea Successfully Launches Homegrown Rocket Nuri

The Ministry of Science and ICT (MSIT, Minister: Lee Jong-ho) and the Korea Aerospace Research Agency (KARI, President Lee Sang-Yul) announced that the second launch of the homegrown space launch vehicle Nuri (Korea Space Launch Vehicle-II, KSLV-II), developed in order to secure Korea's space transportation capability, was successful, thanks to people's interest and support.

After the Nuri rocket, which was launched at 16:00, finished its flight, KARI carried out an early analysis of the telemetry data sent from Nuri and confirmed that Nuri successfully separated and put the performance verification satellite into the targeted orbit.

After the launch, the flight of Nuri progressed normally in accordance with the set flight sequence.

The first, second and third stage engines of Nuri all burned out as planned and the fairing separation was also successful, making the separation of the performance verification satellite successful as well.

The location of the performance verification satellite was confirmed after it made communication with the King Sejong Station in Antarctica; two-way communication

with KARI ground station will be conducted starting 3:00 a.m. the next day to check the satellite's state.

The success of Nuri is meaningful in that it shows Korea has secured its own capacity for independent space transportation and space development.

This launch has completed the development of Nuri, and four more test launches will be made by 2027 to improve the launch vehicle’s reliability.

Minister Lee Jong-ho of Science and ICT said, "Building on the experience and technologies of Nuri development, the government will promote the development of more advanced space launch vehicles to improve Korea's capabilities to launch satellites."

He continued, "I would like to express my heartfelt gratitude to the Korean people for their warm encouragement and support throughout our journey, as well as to all scientists, engineers and industry people for their hard work and dedication to make the launch successful."

For further information, please contact the Public Relations Division (E-mail: msitpress@korea.kr) or Deputy Director Kim In(E-mail: kiminkimin@korea.kr) of the Ministry of Science and ICT.

1. Going Global

1.1 The fifth meeting of ROK-ASEAN Joint Science and Technology Committee

The Ministry of Science and ICT (MSIT, Minister: Lee Jong-Ho) virtually had the fifth meeting of ROK-ASEAN Joint Science and Technology Committee on June 15 with Association of South-East Asian Nations(ASEAN) Committee on Science, Technology & Innovation. The Joint Committee is a regular meeting held every two years since 2013 to strengthen cooperation in science and technology between Korea and ASEAN.

This year's meeting served as an opportunity to better understand the science and technology policies of Korea and ASEAN by sharing major related policies. Based on the shared interest, new cooperation measures in carbon neutrality, green transition, and research environment were discussed.

At the end of the meeting, Korea and ASEAN agreed to develop ROK-ASEAN Joint Science and Technology Committee to ROK-ASEAN Joint Science, Technology, and Innovation Committee.
For further information, please contact Spokesperson for foreign media Kim Hee-Hyun (E-mail: coro0131@korea.kr, 82-44-202-4027) of the Ministry of Science and ICT.

1.2 Korean Researchers Elected as Vice-Chairpersons of ITU-D Study Groups

The Ministry of Science and ICT (MSIT, Minister: Lee Jong-ho) announced that Director Ko Sangwon and Senior Research Fellow Jun Seonmin of the Korea Information Society Development Institute (KISDI) was elected vice-chairperson of the ITU-D Study Group 1 (SG1) and vice-chairperson of the ITU-D Study Group 2 (SG2), respectively, at the ITU World Telecommunications Development Conference (WTDC-22)* held in Kigali, Rwanda from June 6 to 16.

The ITU-D SG1** and SG2*** are dedicated to the research and discussion on improving ICT connectivity and digital transformation policy and regulations for developing countries' ICT sector and addressing the global digital divide.

* World Telecommunication Development Conference is held every four years adopt a WTDC declaration for the next four years, develop ITU-D strategies and programmes, and set ITU-D study group topics and projects.

** SG1: Enabling environment for meaningful connectivity
*** SG 2: Digital transformation

Each study group is composed of one chairperson and vice-chairpersons from six regions. Director Ko was re-elected after serving as vice-chairperson in the last session of SG1, and Senior Research Fellow Jun was elected after serving as SG1 rapporteur.

Vice-chairpersons of ITU study groups serve for four years and assist the chairperson with managing study group meetings and drafting the final report to be submitted to the next WTDC.

The MSIT expressed its hope that Korea would continue to strengthen its leadership in global ICT policies by actively participating in discussions involving ICT development and efforts to bridge the global information gap and sharing Korea's best practices and policy experiences.

Korea has long been engaging in ITU-D activities, but this is the first time that two Koreans were appointed chairmen. This is expected to help Korea take a leading role in the key ITU-D activities and improve its standing in the international community.

It is expected that this will enable Korea to more actively share its success stories and policies to developing countries through ITU-D activities for the next four years, which will enhance the country's reputation as an ICT powerhouse and strengthen its leadership in development assistance.

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1.3 Korea Takes Leadership Role in the ITU's Efforts to Develop Global Standards for 6G

The Ministry of Science and ICT (MSIT, Minister: Lee Jong-Ho) announced that Korea completed the development of a 6G future technology trend report** at the 41st International Telecommunication Union meeting of Working Party 5D (ITU-R WP5D*) held in Geneva, Switzerland from June 13 to 24.

* The International Telecommunication Union (ITU) presented the 6G Vision that will serve as a standardization blueprint containing 6G target services, key performance indicators, and standardization work schedule (June 2023), and will promote the development of a 6G global standard (June 2030)

** Future technology trends of terrestrial IMT systems towards 2030 and beyond

Korea is a co-chair of a working group that studies 6G future technology trends (Professor Oh Seong-Jun, Korea University), and developed the report to reflect the domestic 6G R&D strategy and the demand for new technologies from the industry, academia and research institutes.

The report captures innovative future technology trends from the development of AI technology to improvement of system reliability and sustainability, strengthening of security, and deployment of various convergence services.

Various 6G service scenarios such as AI-based services and sensing-communication cooperation-based services are under discussion.

Other technologies included in the report such as advanced wireless access technology (AI convergence communication, sensing convergence communication, full-duplex communication, etc.) and wireless network technology (digital twin, coverage expansion, communication-computing

convergence, etc.) are expected to be reflected in the 6G Vision that defines 6G target services and required performance.

During the meeting Korea also held a workshop as the chair country of the 6G Vision group to introduce the progress of the ITU's 6G Vision, present directions for 6G Vision development and research to ITU members (193 countries) and organizations, and encourage international cooperation.

Director General Kim Jeong-sam of the Cyber Security and Network Policy Bureau of MSIT said, "Korea is taking initiative in the ITS's discussion of emerging technologies and 6G vision, which places us in a very strong position over the 6G global leadership."

He added that especially as the 6G Vision will serve as a guidance on global 6G R&D, frequency allocation, standardization, and commercialization, "the Ministry will spare no effort to support standardization efforts so that we can gain leadership in Pre-6G technologies and global standards for 6G."

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2. Global Cooperation

2.1 The 7th Korea-Italy Science and Technology Innovation Forum

The Ministry of Science and ICT (MSIT, Minister: Lee Jong-Ho) announced that the 7th Korea-Italy Science and Technology Innovation Forum will be held at Seoul from June 20 to 22. Korea and Italy have been strengthening cooperation in the science and technology field since 1984, and from 2003 on, both countries have been hosting science and technology forums in turn.

This year's forum served as a venue to present the most current research topics and to share opinions on four themes, Aerospace, Microelectronics, Hydrogen Research, and S&T applied to cultural heritage.

During the forum, experts from industries and academia discussed cooperation measures by examining actual practices where research outcomes are applied to.

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3. ICT Trends of Affiliated organazations

3.1 UNIST to Develop Key Technologies for Next-generation, Highly Integrated Semiconductors

The Ministry of Science and ICT (MSIT, Minister: Lee Jong-Ho) announced that the research team* led by Professor Hyeon Suk Shin at Ulsan National Institute of Science and Technology (UNIST) has successfully developed the technologies that can demonstrate single-crystal multi-layered hexagonal Boron Nitride (hBN)** for the world's first time.

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** hBN : hexagonal Boron Nitride

On June 2, the results from this research, which was conducted thanks to the support from the Future Technology Research Lab, Leadership Research, and Basic Research Lab Project of the Ministry of Science and ICT, were published in Nature, an international academic journal.

hBN is known as the only two-dimensional (2D) insulating material, that can prevent degradation of functions such as charge trap and charge scattering, which may occur from next-generation, highly integrated semiconductors.

Next-generation, highly integrated semiconductors deploy technologies, which can solve issues including leakage current and heat generation, by converting silicon into molybdenum disulfide (MoS2), which is 2D semiconductor, and increase the level of integration in chips.

However, this highly integrated semiconductor requires an insulator that physically separates wafer from MoS2, because a charge trap occurs when MoS2 is in direct contact with the wafer.

In addition, as to prevent charge scattering, the insulating material should be the same 2D material as MoS2. Since 2D materials are connected to each other in 2D flat surface, charge scattering, which may be a problem in three-dimensional structure like silicon, does not occur here.

Until now, the development of a technology that can synthesize 2D insulating material in a single cystal form that has appropriate thickness, enough to be used in semiconductor devices, has been a challenge. The research team was able to synthesize hBN single crystal that can be adjusted in thickness, through a new synthesis method, capable of adjusting the level of concentration of materials required for synthesis.

Although cases of synthesizing hBN large enough for commercial launch have been published in Nature and Science so far, this is the first time in the world that a single crystal has been synthesized in the form of multi-layered thin film.

Professor Hyeon Suk Shin talked about the significance of this research by saying that, "Thanks to this study, we could develop technologies for synthesizing materials, that can solve physical limits of traditional highly integrated semiconductors, which are represented by the Moore's Law."

Professor Shin went on to say that "As it is frequently reported that hBN can be used in not only semiconductors but also hydrogen fuel cell electrolyte membranes, next-generation secondary battery electrode materials, and quantum light sources, additional research should be carried out actively to secure fundamental technologies for material production."

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