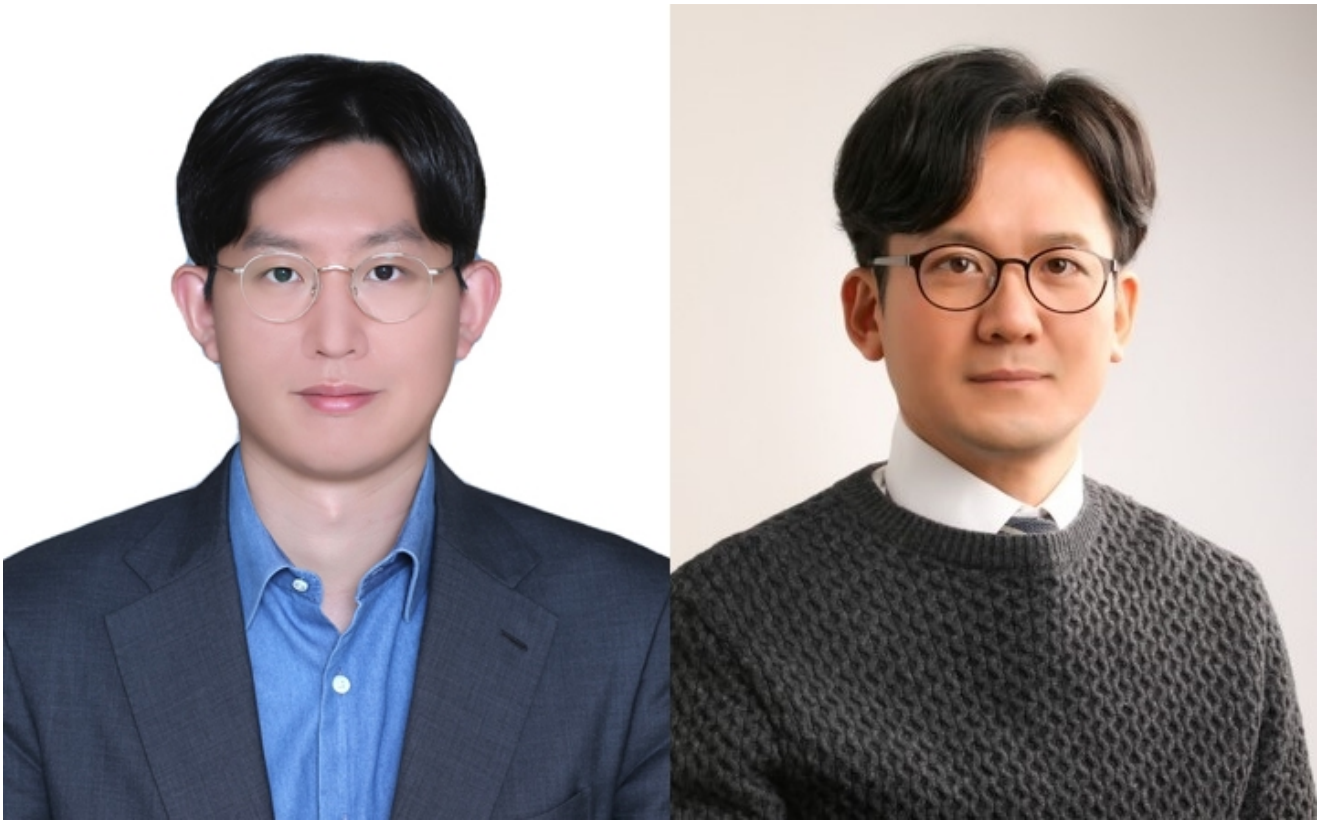
GIST selected by Samsung's future technology development project

— Professor Youngjae Choi's team researches molecular purification technology for mass production such as vaccines
— Professor Sang Yun Lee's team researches high-efficiency quantum repeater for large-scale quantum networks



▲ From left: School of Materials Science and Engineering Professor Youngjae Choi and Department of Physics and Photon Science Professor Sang Yun Lee

GIST (Gwangju Institute of Science and Technology, President Kiseon Kim) research teams received a total of 2.7 billion won from Samsung Group for three years to conduct research to develop new technologies in the future.

GIST announced that School of Materials Science and Engineering Professor Youngjae Choi (born 1988) and Department of Physics and Photon Science Professor Sang Yun Lee (born in 1975) were selected for the 'Samsung Future Technology Promotion Project' supported by the Samsung Future Technology Promotion Foundation and Samsung Electronics, and that they will conduct research for vaccines, treatments, and next-generation quantum relays, respectively.

Professor Youngjae Choi, who was hired by GIST last year, received 1.5 billion won in support and will conduct research on molecular refining technologies for mass production of RNA vaccines and treatments with ATTY LifeTech Co., Ltd. (co-researcher: CEO Tae-hoon Ryu) for three years from the first half of this year.

RNA is a biomaterial that has seen the greatest increase in demand since COVID-19, and there have been many problems with material reliability during the production stage. Professor Youngjae Choi's team developed a new molecular purification technology that can improve the RNA purification yield*, which is currently below 70%, to more than 99%, and refines only molecules with the desired design

(sequence and length) to create RNA vaccines and therapeutics, and they plan to streamline the production process.

* RNA purification yield: the ratio of isolating exactly the desired sequence among RNA molecules

Professor Youngjae Choi said, "To secure high functionality and reliability of mRNA vaccines and new RNA drugs, molecular purification technology that improves the RNA purification yield is essential. Within five years, we will strive to contribute to strengthening K-Bio's competitiveness by raising the RNA purification yield, which is currently less than 70%, to 99%."

Professor Sang Yun Lee, who was appointed to GIST in 2020, plans to conduct research on quantum repeaters using semiconductor point defects by receiving 1.2 billion won from June this year for the next three years with the goal of developing a quantum repeater using semiconductor point defects.

To put more secure quantum cryptographic communication into practice, a large-scale quantum network must be implemented. Since quantum networks start with realizing quantum entanglement between multiple quantum memories through photons, it is necessary to develop high-efficiency, high-reliability quantum repeaters that combine quantum light sources and quantum memories.

Professor Sang Yun Lee developed a quantum repeater with high efficiency and reliability by using silicon vacancy defects in silicon carbide, and he plans to realize the high scalability necessary for realizing large-scale quantum computing for the quantum Internet.

To this end, Professor Sang Yun Lee formed a joint research team with Professor Young-wook Cho's team from the Department of Physics at Yonsei University who has expertise in the study of atom-photon interactions and quantum optics.

Professor Sang Yun Lee said, "To develop a new spin-photon entanglement protocol that can dramatically improve quantum repeater performance, we intend to develop a quantum repeater that can achieve high efficiency and reliability at the same time by using point defects of silicon carbide to which it can be applied, and this will advance the feasibility of realizing practical large-scale quantum networks."

The Samsung Future Technology Promotion Project focuses on domestic basic science development and industrial technology innovation and is a public interest research support project implemented in August 2013 by Samsung Electronics with the goal of solving social problems by donating 1.5 trillion won. If selected as a research project for the Samsung Future Technology Promotion Project, a research grant can be received for up to five years.