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Professors Hohjai Lee and Jiwon Seo's joint research team was selected by the Samsung Future Technology Foundation for project support

- GIST (Gwangju Institute of Science and Technology, President Kiseon Kim) Department of Chemistry Professors Hohjai Lee and Jiwon Seo was selected for the Samsung Future Technology Promotion Project, which is supported by Samsung Electronics.
- The research team's proposed 'Peptoid-Based Exciplex System for Quantum Teleportation' is a molecule that chemically synthesizes a qubit (quantum bit), which is the basic unit of future quantum computer technology, and aims to create and implement quantum teleportation*, which is one of the basic processes of quantum computing.

* quantum teleportation: The process of transferring quantum information generated from one side to the another that is spatially separated without the movement of energy or matter. At this point, quantum information is transmitted through quantum entanglement.

- The research team plans to synthesize a peptoid*-based electron transport system over the next three years of research. It plans to generate, control, and measure electron spin of qubits using photochemistry and electron paramagnetic resonance (EPR) spectroscopy techniques.

* peptoid: a new material developed to artificially simulate the structure and function of biological proteins and peptides in nature and has the advantage of being easier to

synthesize and precisely control its structure compared to the existing branched polymers or artificial proteins

- One of the research team's achievement was its peptide-based exciplex* study [J. Phys. Chem. Lett. 11 4668 (2020)], which revealed that radical pairs entangled in quantum states can be stably generated during photoexcitation-induced electron transfer. Based on the fact that the quantum state of a single electron in the local pair can be effectively controlled when connected to a peptide, a quantum transfer system with the spin of the single electron present in the radical was designed and proposed.

* exciplex: It is an excited complex formed between two different molecules. When the complex is formed, one is excited and the other is combined in a ground state.

- Professor Hohjai Lee said, "Until now, research on quantum computers and quantum information has been mainly focused on photons, atoms, molecules, or solid states trapped in extreme conditions from the viewpoint of physics. However, this research is expected to be a good opportunity to contribute to the development of chemical quantum systems by utilizing the advantages of chemistry with chemical ideas."
- Samsung Electronics invested 1.5 trillion won in 2013 to establish the Samsung Future Technology Promotion Foundation (Basic Science) and Samsung Future Technology Development Center (Material Technology, ICT Creation Tasks), and it has provided about 812.5 billion won in research funds so far, including the tasks presented this time to top researchers studying promising future technologies. In the second half of this year, a total of 15 tasks were selected for basic science, including five for mathematical science, four for life science, four for chemistry and two for physics.

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