

Professor Hyeon-Jin Shin of the Department of Semiconductor Engineering selected as 2025 POSCO Science Fellow

- Professor Hyeon-Jin Shin, 'Research on thin film deposition of next-generation topological semi-metallic new materials for high semiconductor integration' proposed and selected in the field of applied science (metals and new materials)... Received 100 million won in research funds for 2 years
- The goal is to secure the original technology for topological semi-metallic thin film and present a new paradigm for interconnect application technology... "Expected to lay the groundwork for accelerating basic research in the fields of next-generation semiconductors and quantum computers"



▲ GIST Department of Semiconductor Engineering Professor Hyeon-Jin Shin

The Gwangju Institute of Science and Technology (GIST, President Kichul Lim) announced that Professor Hyeon-Jin Shin of the Department of Semiconductor Engineering has been selected as the 2025 POSCO Science Fellow of the POSCO TJ Park Foundation.

Professor Shin proposed 'Research on thin film deposition of next-generation topological semi-metallic new materials for high semiconductor integration', which was selected as a research topic in the field of metals and new materials.

This study aims to develop a large-area thin-film platform for topological semi-metals, which are emerging as new interconnect metal materials for performance enhancement due to high integration of semiconductor devices, and to systematically establish the possibility of new materials by establishing the relationship between defect structure and conduction characteristics.

Topological materials, which are substances that exhibit new quantum states defined by topological invariants, include topological insulators, semi-metals, and superconductors, which theoretically enable ultra-fast electron transport through charge transport without resistance or loss. Applying these to

electronic devices suggests the possibility of overcoming limitations in power consumption and processing speed, but basic research on stable large-area thin films and material structures and properties is still insufficient.

The large-area thin-film technology for topological semi-metals proposed by Professor Hyeon-Jin Shin is a technology that forms a thin film with improved crystallinity and uniformity through an original method that utilizes substrate surface and phase transition energy control, unlike the existing nanowire technology. It is expected to secure the original technology for large-area thin-film formation and establish the foundation for large-area thin-film formation of various topological materials, contributing to securing leadership in the field of new materials.

In addition, ▲ based on thin film technology, it provides opportunities for basic property research on structure and conductivity characteristics as well as verification of application expandability through material structure control such as crystal size and defects of topological semimetals, while ▲ topological semimetal thin films not only present a new paradigm of interconnect technology for next-generation high-integration semiconductors, but also have the potential to be materials for future innovative devices such as quantum computers, and are expected to contribute to the creation of new industries.

Professor Hyeon-Jin Shin said, "We hope that this study will contribute to establishing a foundation for large-area thin film research of various topological semi-metallic materials and, furthermore, serve as a starting point for accelerating basic research in the fields of next-generation semiconductors and quantum computers."

Meanwhile, the POSCO Cheongam Foundation selects about 30 scientists each year who are researching basic and applied sciences to support their growth as world-class scientists in Korea.

The POSCO Science Fellowship provides a total of 100 million won in research funds for two years to young and capable professors with less than three years of employment who are conducting research in four fields of basic science (mathematics, physics, chemistry, and life science) and two fields of applied science (metals, new materials, and energy materials) at domestic universities and research institutes.