

GIST School of Materials Science and Engineering student Jae-young Jung won the Excellence Paper Award for materials

- Arc discharge (a state in which a part of the electrode material evaporates and becomes a gas due to the peak of gas discharge) atomic catalyst synthesis technology development**



▲ School of Materials Science and Engineering student Jae-young Jung

GIST (Gwangju Institute of Science and Technology, President Kiseom Kim) Department of Materials Science and Engineering student Jae-Young Jeong (advising professor: Ji-Woong Park) who will soon receive a Ph.D. won the 2022 Materials Excellence Paper Award from the Korea Institute of Materials Science (KIMS, President Jung-hwan Lee).

Student Jae-young Jung synthesized a single atom catalyst through a phenomenon in which elements decompose and recombine through ionization in the high-energy arc state. In particular, he developed the original technology to manufacture nano-carbon-based, single-atom catalysts with M-N_x-C structures at a commercial level.

The proposed single atom catalyst synthesis technique is universally applicable to various metals and nanocarbons. In addition, through the research, the synthesis principle was clarified that metal atoms are stably coordinated and fixed in the carbon lattice when carbon, nitrogen, and metal are decomposed by arc discharge in forming nitrogen-doped highly crystalline nano-carbon.

The developed catalyst showed twice the oxygen reduction performance and excellent durability compared to the existing noble metal catalyst. When applied to an actual fuel cell, it can be operated with an excellent power density that surpasses the performance of other non-precious metal-based atomic catalysts, and the results were published in *Small methods*, an international SCIE academic journal.

Student Jae-young Jung also conducted research using high-performance electrochemical catalysts as key materials for hydrogen fuel cells and water electrolysis technology and has published research results in a number of internationally renowned international journals in the fields of energy/environment/materials science and technology.

Meanwhile, the Korea Institute of Materials Science and Technology has awarded outstanding thesis awards to a total of 54 students from 11 universities, starting with the Korea Advanced Institute of Science and Technology in 2003, to develop excellent students at major universities and establish a network base in the material field.