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Release Date	2021.02.02	

Professor Chang Hyuck Choi and Professor Jiwon Seo's joint research team developed a high-performance carbon dioxide conversion catalyst material (National Research Foundation of Korea)

□ A clue to catalyst material for effective carbon dioxide conversion has emerged.

◦ GIST (Gwangju Institute of Science and Technology, President Kiseon Kim) School of Materials Science and Engineering Professor Chang Hyuck Choi, Department of Chemistry Professor Jiwon Seo, and Korea Advanced Institute of Science and Technology Professor Hyungjun Kim developed design technology for a high-performance carbon dioxide catalyst material.

□ Carbon dioxide conversion is a technology that produces high value-added compounds through the reaction of carbon dioxide and water, and research for its practical use is active. Among them, the development of an efficient catalyst is regarded as an important factor that will determine the success of the carbon neutral policy.

◦ Transition metal* catalysts arranged at the atomic level are attracting attention because they can efficiently convert carbon dioxide.

* transition metal: a metal element of 4~7 cycles and 3~11 groups located on the periodic table

◦ However, due to the mixed structure, the understanding of catalysts such as identifying active points is insufficient. To develop a high-performance catalyst that can be put into practical use, the identification of the active point* of the catalyst and the design of a reasonable active point are necessary.

* active point: the part on the surface of the catalyst where the reaction material receives the catalytic action

□ The research team introduced a structure precisely controlled at the atomic level to derive the active point of the monoatomic transition metal catalyst* that is excellent for electrochemical conversion of carbon dioxide.

* monoatomic transition metal catalyst: a catalyst whose active point is composed of one metal atom with comparable performance to metal catalysts; using a relatively small amount of inexpensive transition metal reduces the cost required for catalyst production

◦ The researchers synthesized two symmetrical structures and broken symmetrical structures and verified that carbon dioxide conversion is efficiently performed in a symmetrically broken structure through various electrochemical and spectroscopic approaches and computational chemistry. The structure whose symmetry is broken favors the formation of reaction intermediates*, thereby enhancing the performance of the catalyst.

* reaction intermediate: a substance produced in the process of converting a reactant into a product in a chemical reaction

□ This research was supported by the National Research Foundation of Korea, the Ministry of Science and ICT, and the Korea Institute of Science and Technology and was published on January 7, 2021, in the *Journal of the American Chemical Society*, which is an international academic journal in the field of chemistry.