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GIST-Caltech international research team develops catalyst for combining AIDS medication

- GIST (President Kiseon Kim) Department of Chemistry Professor Sukwon Hong and Caltech Professor Brian M. Stoltz led a research team developed a catalyst that will be able to efficiently synthesize three-dimensional molecular structures containing trifluoromethyl groups found in many medicines, including HIV treatments.
 - The new catalyst is of great significance in that it can be applied to the synthesis of efavirenz, which is an antiretroviral drug used to prevent and treat AIDS.
 - * reverse transcriptase: an enzyme used to generate complementary DNA from an RNA template, which is unique to retroviruses
- The developed catalyst consists of a multifunctional salen ligand containing a nickel core metal and a polyether unit. The cooperative coupling of the polyether unit and alkali metal produces a cooperative catalyst. As such, one metal catalyst cooperatively activated both reactants simultaneously, resulting in excellent catalytic activity (yield 99%) and stereoselectivity (97% ee).
 - In addition, a joint study with GIST Department of Chemistry Professor Han Min Su Han conducted a UV-vis absorption spectrometry experiment to show that catalyst and potassium cations are in stoichiometric 1:1 bonds ($K_a=6.6 \times 10^5 \text{ M}^{-1}$), demonstrating that the positive ion binding capacity plays an important role in the catalytic reaction.

- Professor Sukwon Hong and Professor Brian M. Stoltz said, "This research resulted in the development of a new synthesis method that allows the reactants to react selectively in the intended direction by developing a catalyst that can simultaneously recognize two reactants, such as bioenzymes. In the future, it is expected to be applicable to the synthesis of derivatives related to efavirenz, an HIV reverse transcriptase inhibitor."

- This work was supported by the "GIST-Caltech Research Collaboration" grant funded by the GIST in 2017, and by the National Research Foundation of Korea grant funded by the Korean Government and was published in *Angewandte Chemie International Edition* on November 12, 2019, in recognition of the importance of the research.

- The Gist-Caltech Joint Research Project is a research cooperation program in which Gist and Caltech professors have been paired since 2012 to form a research group to conduct innovative and creative joint research. GIST Professor Sukwon Hong and Caltech Professor Brian M. Stoltz announced their achievements as a joint research project, "Development of Cooperative Functional Catalysts for Innovative Organic Synthesis."

