Aiichiro Nagaki, Madridge J Pharm Res. 2018
http://dx.doi.org/10.18689/2638-1591.a2.002

Organolithium Chemistry using Flow Microreactors

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Many successful applications reported in the literature speak well for the power of the flow-microreactor method in chemical synthesis. The reaction time in a flow microreactor is defined as the residence time between a reagent inlet and the quencher inlet, which can be controlled precisely and reduced to millisecond order by adjusting the length between these positions and the flow speed. Such a feature of flow microreactors enables the use of short-lived highly reactive intermediates for synthesis. Various intermediates can be rapidly generated and transferred to another location in the flow system for use in subsequent reactions before they decompose. Protecting-group-free synthesis has received significant recent research interest in the context of ideal synthesis and green sustainable chemistry. In general, organolithium species react with electrophilic functional groups very rapidly, and therefore such functional groups should be protected before an organolithium reaction, if they are not involved in the desired transformation. If organolithium chemistry could be free from such a limitation, its power would be greatly enhanced. A flow microreactor enables such protecting-group-free organolithium reactions by choosing the appropriate residence time and the reaction temperature. Organolithium species bearing alkoxycarbonyl, nitro, ketone and aldehyde carbonyl groups can be generated by lithiation of the corresponding organic halides and reacted with various electrophiles using a flow microreactor system. In this presentation, we report that a flow microreactor system enables the generation of various unstable organolithium compounds.

Biography:

Dr. Aiichiro Nagaki has received his Ph.D. in 2005 from Kyoto University under the supervision of Professor Jun-ichi Yoshida. He worked with Professor Hiroaki Suga, Tokyo University from 2005 as a postdoctoral fellow. In 2006, he became an assistant professor of Kyoto University. In the year 2013 he promoted to Junior Associate Professor. His current research interests are organic synthesis, polymer synthesis, and microreactor synthesis. Awards: Takeda Pharmaceutical Co., Ltd. Award in Synthetic Organic Chemistry, Japan (2012), Incentive Award in Synthetic Organic Chemistry, Japan (2012), and Young Innovator Award on Chemistry and Micro-Nano Systems (2013).