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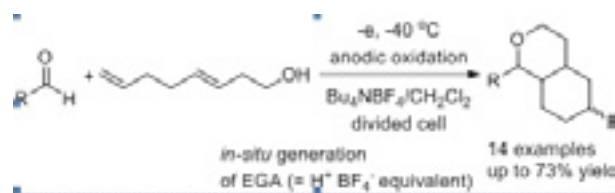
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Synthesis of fluorinated bicyclic molecule via Prins cyclization using electro-generated acid

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Prins cyclization using simple aldehydes and homoallylic alcohols in the presence of acid reagents is well known to form functionalized tetrahydropyrans, and the reactions have been extensively studied so far. Because tetrahydropyrans are important and interesting unit in bioactive molecules, a new synthetic development in this field has been still required. In the view point of integration of Prins cyclization, some interesting reactions have been reported. For example, sequential Sakurai-Prins-Ritter reactions are developed by Rovis, T. *et al.* This reaction involves Prins cyclization in the latter stage. Tandem Prins/Friedel-Crafts cyclization has recently been reported by Yadav, J. S. *et al.*, in which the generated carbocation by Prins cyclization was trapped by aromatic ring to form heterotricycles. However, to the best of our knowledge, there is no report of tandem Prins/cationic cyclization using aldehyde and non-conjugated diene alcohol as integrated Prins cyclization. We have recently reported that the electrochemical oxidation of the solution of aldehydes and homoallylic alcohols in $\text{Bu}_4\text{NBF}_4/\text{CH}_2\text{Cl}_2$ afforded the corresponding fluorinated tetrahydrofurans via Prins cyclization. During the course of our study, we found that this type of cyclization reaction could be extended to tandem Prins/cationic cyclization (Scheme 1). The electrochemical oxidation of octanal ($\text{R} = \text{C}_7\text{H}_{15}$) and (E)-4,7-octadiene-1-ol in $\text{Bu}_4\text{NBF}_4/\text{CH}_2\text{Cl}_2$ at -40°C in divided cell gave the corresponding fluorinated bicyclic compound in 73% yield. The same reactions were also found to be promoted by Lewis acids. In the presentation, the detail of the reactions including optimization, scope and limitations, and mechanism will be discussed.



Scheme 1: Synthesis of fluorinated bicyclic molecule using electro-generated acid.

Biography

Kouichi Matsumoto graduated from Kyoto University in 2005. He received his PhD in 2010 from Kyoto University under the supervision of Professor Jun-ichi Yoshida. In 2010, he joined the group of Prof. Shigenori Kashimura at Kindai University as an Assistant Professor. He was promoted to Lecturer in 2014. His current research interests are in 1) the development of new reactions using electro-organic chemistry, 2) the kinetic analysis of electro-generated reactive species using Raman spectroscopy, and 3) the synthesis of organic materials for organic thin film solar cells. He is awarded with the Student Presentation Award in the 89th CSJ spring meeting (2009), and got Prize of the Promotion of Engineering Research in Foundation for the Promotion of Engineering Research (2012)

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