Rhodium-Catalyzed Intramolecular Carbofluorination of Alkenes Using Acyl Fluorides via Carbon–Fluorine Bond Cleavage

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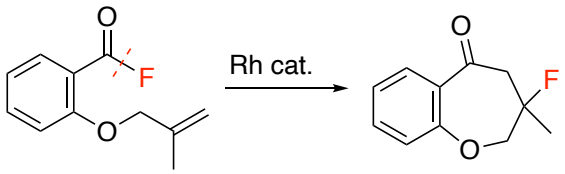
Fluorinated organic compounds occupy an important place in the many fields including materials, agrochemical, and pharmaceutical sciences.[1] Therefore, the development of catalytic reactions for the synthesis of organic fluorine compounds is key to further advancement in these areas of research. Insertion of alkenes or alkynes into a carbon–fluorine bond of organic fluorine compounds would be a powerful method for the synthesis of monofluoroalkanes or alkenes because it enables simple organofluorine compounds to be upgraded to more elaborate fluorinated molecules with a 100% atom economy. Such an insertion reaction requires a catalyst that can mediate both cleavage and formation of a C–F bond, which represents a daunting challenge. In fact, only one example of catalytic insertion of alkynes into a C–F bond has been reported to date.[2,3] Herein, we report on intramolecular carbofluorination of alkenes using acyl fluorides via carbon–fluorine bond cleavage, which is catalyzed by a rhodium complex.



1) Selected reviews: (a) Shimizu, M.; Hiyama, T. *Angew. Chem., Int. Ed.* **2005**, *44*, 214−231; (b) Müller, K.; Faeh, C.; Diederich, F. *Science*, **2007**, *317*, 1881−1886; (c) Purser, S.; Moore, P. R.; Swallow, S.; Gouverneur, V. *Chem. Soc. Rev.* **2008**, *37*, 320−330.
2) Fujimoto, H.; Kodama, T.; Yamanaka, M.; Tobisu, M. *J. Am. Chem. Soc.* **2020**, *142*, 17323-17328.
3) Catalytic insertion of carbenes into a C–F bond of benzyl fluorides was recently reported: Wang, F.; Nishimoto, Y.; Yasuda, M. *J. Am. Chem. Soc.* **2021**, *143*, 20616-20621.