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參展科別 化學
作品名稱 Difluoromethylation of arylidene
Meldrum's acid derivatives
得獎獎項 二等獎

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Summary

Fluorine-containing compounds gained significant attention during the past decade¹. About 20% of novel pharmaceuticals and 40% of novel agrochemicals every year contain at least one fluorine atom in the molecule. For a long time the most frequently used was trifluoromethyl group, but nowadays the most promising is the chemistry of partially-fluorinated groups. For example, the difluoromethyl substituent (CHF_2) exhibits unique pharmacoforic properties capable of serving as lipophilic hydrogen bond donor thus being bioisosteric to hydroxyl group².

There are several general approaches for the formation of a required fluorinated fragment, one of them is direct nucleophilic fluoroalkylation. This approach is well-developed for trifluoromethylation reactions, such as addition of CF_3 -anion equivalents to $\text{C}=\text{O}$, $\text{C}=\text{N}$ and electron-deficient $\text{C}=\text{C}$ bonds or metal-catalyzed substitution in haloarenes³. However the similar difluoromethylation processes are still quite challenging.

Herein we present a novel and convenient protocol for the synthesis of β - CF_2H functionalized carbonyl compounds and carbinols by nucleophilic difluoromethylation of electron-deficient olefines.

The process is based on a 1,4-addition of in situ generated⁴ phosphorus ylide $\text{Ph}_3\text{P}=\text{CF}_2$ **2** to the aryldene Meldrum's acid conjugates **1**. The resulting phosphobetaines **3** are hydrolyzed/protodephosphorilated without isolation, giving β - CF_2H substituted carboxylic acids **4**. The latter may be easily transformed to the corresponding ethers **5** and alcohols **6** without preliminary purification.

【評語】 030034

This research involved the development of the synthesis of β -CF₂H functionalized CO compounds. The author accomplished the synthesis of several CF₂H substituted compounds with high yields. Also, he completed the characterization of these compounds by different analysis. This is an excellent research work.