Methods for the Synthesis of Organofluorine Compounds: from Difluorocarbene to Photocatalysis

A novel concept for the synthesis of gem-difluorinated compounds from three components — difluorocarbene, nucleophile, and electrophile was proposed [1]. Performing consecutive bond-forming reactions by successive attachment of nucleophile and electrophile to difluorocarbene provides opportunity for the synthesis of wide variety of organofluorine compounds. A process involving insertion of difluorocarbene into the carbon-zinc bond followed by coupling of difluorinated organozincs with carbon- and heteroatom-centered electrophiles was developed [2-5]. An efficient method for nucleophilic difluoromethylation of π-electrophiles (aldehydes, azomethines, Michael acceptors) based on the reaction of difluorinated phosphorus ylide was elaborated [6-8]. Most recent work involves the application of photoredox catalysis relying on activation of C-P and C-I bonds promoted by visible light [9-14].


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