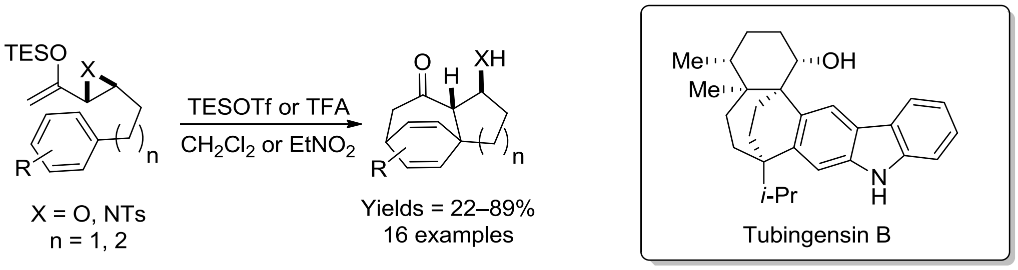
Application of Epoxy and Aziridinyl Enolsilanes in Dearomative (4+3) Cycloadditions

Jesse Ling, Sarah Lam and Pauline Chiu*
Department of Chemistry, University of Hong Kong
Pokfulam Road, Hong Kong, China

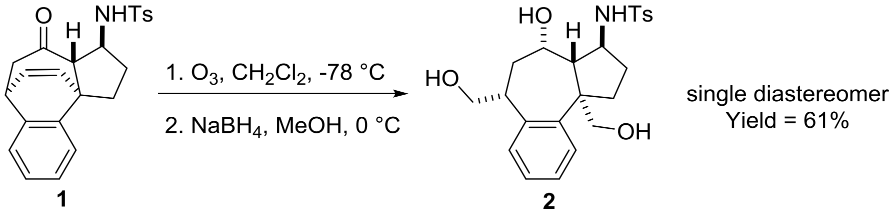
We have been using vinyl epoxide and aziridine derivatives, namely epoxy and aziridinyl enolsilanes, as dienophiles for diastereoselective (4+3) cycloadditions. They react with a wide range of dienes, including furans and pyrroles, to generate high yields of heterocycles embedded in seven-membered rings. This reaction has been applied to the synthesis of various heterocyclic bioactive molecules, such as cortistatin A.

Under suitable conditions, carbocyclic arenes also undergo (4+3) cycloaddition as dienes with epoxy/aziridinyl enolsilanes (Scheme 1). This intramolecular reaction, in effect a dearomatization, is surprisingly facile, and occurs even on benzene derivatives. The scope and the mechanism of the reaction have been studied. This dearomative cycloaddition may be applicable to the synthesis of polycyclic natural products such as tubingensin B.



Scheme 1

The olefin bridge of cycloadduct **1** can be cleaved under reductive ozonolysis to afford polycyclic triol **2** as a single diastereomer (Scheme 2). This demonstrates the potential of the dearomative (4+3) cycloaddition to synthesize bridged and non-bridged polycycles alike.



Scheme 2

Ling, J; Lam, S; Low, K.-H.; Chiu, P. *Angew. Chem., Int. Ed.* **2017**, *56*, 8879–8882.
Lam, S. K.; Lam, S.; Wong, W.-T.; Chiu, P. *Chem. Commun.* **2014,** *50* (14), 1738-1741.
Lo, B.; Lam, S.; Wong, W.-T.; Chiu, P. *Angew. Chem., Int. Ed.* **2012**, *51*, 12120–12123.