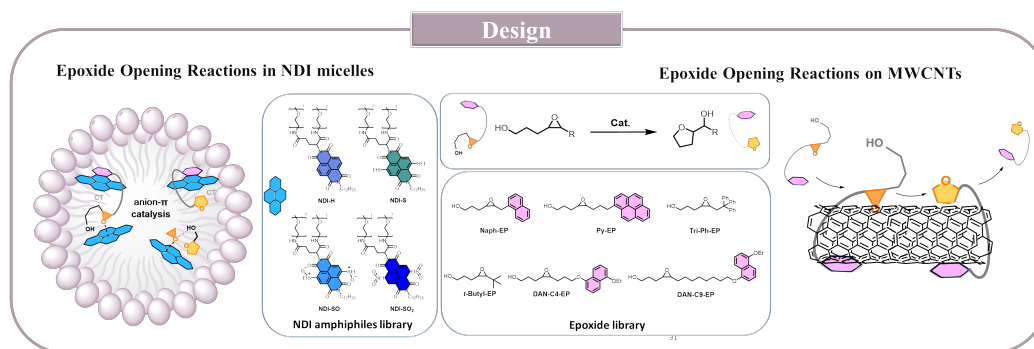


Anion- π catalysis induced epoxide-opening ether cyclizations on different surfacesM. Tan¹, M. Gutiérrez López¹, N. Sakai¹, S. Matile^{1*}¹Department of Organic Chemistry, and University of Geneva, 1211 Geneva, Switzerland

Anion- π catalysis, that is the stabilization of anionic transition states and reactive intermediates on π acidic aromatic surfaces, is rare in nature and has been ignored for a long-time in chemistry.¹ Since anion- π catalysis was reported in 2013 firstly, with the enolate addition chemistry in place, anion- π catalysts up to π -stacked foldamers, fullerenes and carbon nanotubes could be developed, which then were used to realize different reactions like asymmetric enamine, iminium, Diels-Alder, transamination or epoxide-opening chemistry^{1,2}.

Naphthalenediimides (NDIs) are well known by its π -acidity when different electron withdraw substituents were installed on its core structures, and the anion- π interaction promoted autocatalysis of epoxide-opening ether cyclizations was first observed on sulfone-NDI derivatives². Herein reported anion- π catalysis in various NDI micelles (e.g., sulfoxide, sulfone) which could provide a space-confined and solvent-free environment in where epoxides could become more concentrated and pre-organized, so that significant rate enhancement and autocatalytic behavior were realized when compared with reactions either in organic solvents or other surfactants.

Meanwhile, carbon nanotubes were known for its induced π acidity in response to the binding of anions or anionic transition states due to the repulsion of the nearby π electrons toward the other end of the π system, thus enabling and strengthening anion binding on the π surface³. Therefore, MWCNTs have been applied in our work to serve as a powerful anion- π catalysts due to their high polarizability. And further electronic field assisted anion- π catalysis on MWCNTs surfaces was also proved promising and practical.



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