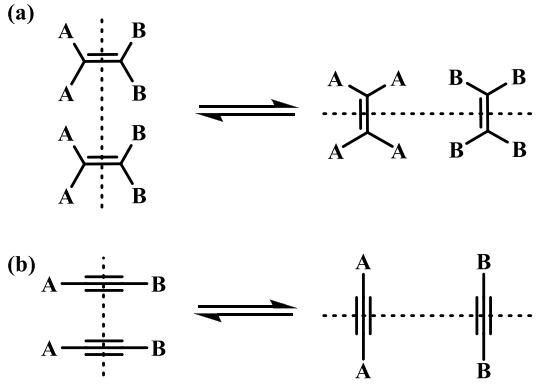
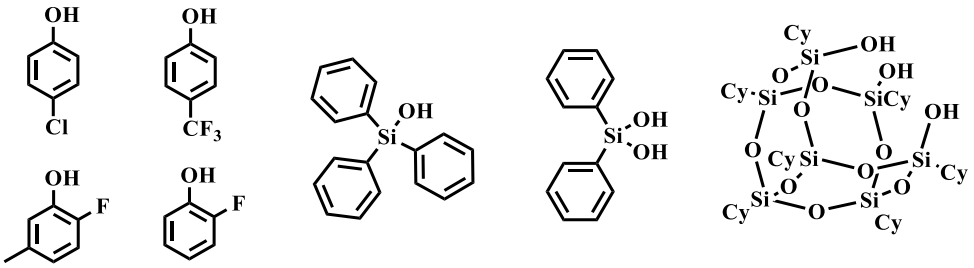
A new perspective for alkyne metathesis - development of new multicomponent catalytic systems based on silanols to be used in organic synthesis.

Metathesis is a kind of double exchange reaction in an organic world. Alkyne metathesis is similar to olefin (alkene) metathesis which has recently found a wide application in organic synthesis and polymer science. A figurative comparison of these two kinds of metathesis can be found in the Scheme 1. They are both reversible catalytic reactions leading to an equilibrium. What is characteristic, in metathesis, the exchange counter intuitively involves cleavage of the multiple bonds between carbon atoms.



Scheme 1. *Olefin metathesis (a); alkyne metathesis(b). Dashed line depicts „cleavage" of a multiple bond.*

Alkyne metathesis can be catalysed by various coordination compounds of molybdenum and tungsten. The first and the most simple homogeneous catalyst was, however, so called *Mortreux system*. Undeniable simplicity and low price, unfortunately along with fairly limited scope of application, are the features that characterise it. This catalytic system comprises a source of metal (mostly a carbonyl complex of molybdenum) and an activator containing active oxygen atom capable of coordinating to the former. These activators cover a range of phenols and certain group of silanols – compounds having Si-OH functional group. The known examples of such activators are presented in the Scheme 2.



Scheme 2. *Examples of known phenolic and silanol activators of the Mortreux system.*

The aim of this project is to modify the contents of the *Mortreux catalytic system* and the reaction conditions in such a way providing extension of its use on a greater scope of alkynes containing functional groups yet excluding them from this transformation. It will be accomplished by synthesis of new silanol-type activators that can be deposited on a solid substrate. This will provide more stability to the catalyst which is normally prone to decomposition on a so-called bimolecular pathway. Grafting it on a support will put catalytic centres further away and without possibility to contact each other. It can also be a step towards recyclability of the catalyst. Other way of improving the performance of this reaction system will be to investigate the possibility to activate it by UV irradiation. It will result in lowering the temperature and allowing metathesis of more unstable alkynes. Moreover, the utility of so obtained catalytic system will be demonstrated by synthesis of exemplary polymers and macrocyclic compounds *via* alkyne metathesis.

The results obtained in the course of this project will be published in peer-reviewed international scientific journals and presented on Polish and international symposia.