Prof. Patrick Théato 講演会

日時：２０１４年１０月３日（金）
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場所：工学部Ｂ－１１２室

“New Possibilities in Post-Polymerization Modifications:
Teaching an old dog new tricks!”

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New Possibilities in Post-Polymerization Modifications: Teaching an old dog new tricks!

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Abstract

Designing a polymer usually involves the incorporation of multiple functional units into a polymer chain. By combining various functional units, a myriad of polymer properties can be fine-tuned. For example, various stimuli-responsive polymers can easily be synthesized from well-defined reactive pre-polymers. This route enables us to incorporate multiple functionalities, which render the obtained polymer responsive to multiple stimuli. Stimuli of interest are: temperature, light and redox.

Post-polymerization modifications are as old as the discipline of polymer science itself. As a matter of fact, the first polymer products were prepared by modifying natural polymers. Ever since, efficient chemistries – nowadays called "click chemistry" – have been utilized in post-polymerization modifications. In the present study, particular focus will be laid on recent developments in post-polymerization modifications utilizing modern multicomponent reactions as well as sequential conversions. These allow the synthesis of complex functionalities in facile synthetic steps. Various approaches will be presented to provide an overview of the possibilities of modern polymer synthesis when it comes to precision synthesis. For example, we could demonstrate the direct conjugation of amines onto polymers featuring alkyne units with the aid of tosylazides under copper(I) catalysis.[1] But also the polymerization of vinylcyclopropanes has been revisited with idea to use the respective polymers for post-polymerization modifications.[2] In conclusion, these and other examples document the valuable contributions synthetic polymer chemistry can make to the future of highly specialized functional polymers.

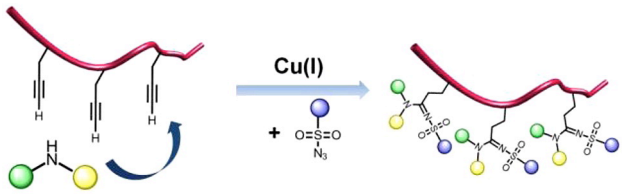

Figure 1: Example of a multi-component reaction that allows the direct conjugation of amines onto polymers featuring alkyne units.[1]

Keywords: Post-polymerization modification, stimuli-responsive polymers, multi-component reactions, click chemistry, activated esters.

References:
[1]R. Kakuchi, P. Theato, *ACS Macro Letters* **2013**, *2*, 419-422.
[2]D. Seuyep, G. A. Luinstra, P. Theato, *Polymer Chemistry* **2013**, *4*, 2724-2730.