Fabiana Ciocchetti, 05/11/2022

In situ Synthesis of Supramolecular Polymers: Finding the Right Conditions when Combining Covalent and Non-Covalent Synthesis

Meijer, Schinitzer et al. Angew. Chem. Int. Ed. 2022, 61, e202206729

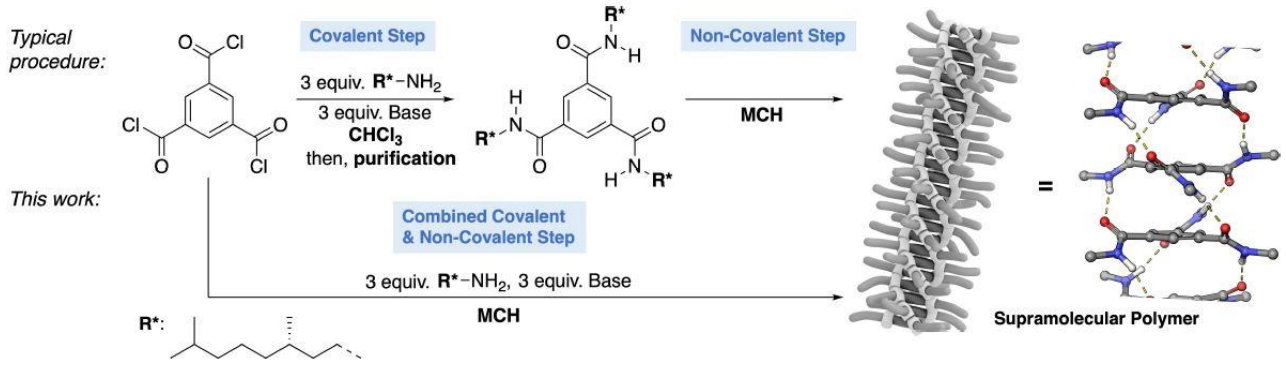

Figure 1: Typical procedure for the synthesis of benzene-1,3,5-tricarboxamide (BTA) monomers followed by purification and subsequent formation of the supramolecular polymers in a second, separate step. Their procedure in which they combine both steps, the covalent amidation and non-covalent assembly.

Who are the corresponding authors and what are their research areas?

Bert Meijer (Eindhoven University of Technology, The Netherlands).

Meijer is a prolific author, sought-after academic lecturer and recipient of multiple awards in the fields of organic and polymer chemistry. His group conducts research in various fields associated to supramolecular polymers, materials and systems. They focus on different organic approaches to make nanomaterials and functional biomaterials, and they also explore novel concepts where excellent polymer properties are combined with dynamic supramolecular interactions.

What is the main claim of the article?

In this article, the Meijer's group investigated the in situ formation of BTA-based supramolecular polymers. Typically, these polymers are prepared in two separate steps: 1) covalent step and 2) non-covalent step (as shown in Fig.1). Here, they combine both, the covalent and non-covalent synthetic reaction step, to study the formation of the supramolecular polymer system over time and demonstrate how even simple reaction mixtures behave complex when covalent reactions are coupled to self-assembly process.

How is it demonstrated?

By using a combination of CD, mass spectroscopy, and computational studies, they discovered that depending on the concentration of the reagents, the final system composition changes, showing a surprising reaction profile.

In particular, they observed an unexpected concentration-dependent phase separation behavior, in which all variables (reactant concentration, reactant solubility or dryness of the solvent) are relevant to determine the system composition.

What are the typical experimental conditions?

Methylcyclohexane (MCH) as a solvent, micromolar concentration range.

Which are the key related papers?

1. Cantekin, S., de Greef, T. F. A. & Palmans, A. R. A. *Chem. Soc. Rev.* **41**, 6125–6137 (2012).
2. N. J. Van Zee, A. R. A. Palmans, E. W. Meijer et al. *Nature* ***558***, 100-103 (2018).