

From Plastic Disassembly to Carbon Capture with Waste Plastic



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Abstract:

The vast amounts of end-of-use plastics and plastic-containing materials released into Nature has resulted in a major environmental crisis, strongly affecting ecosystems across the globe. There is an urgent need for the implementation of a circular economy of plastics and plastic-containing composites for reducing the consumption of resources, as well as limiting the introduction of waste into the environment. In this talk, I will summarize our synthetic efforts on the use of transition metal catalysis for the disassembly of thermoset plastics to base chemicals, including products prepared from polyurethanes and epoxy composites. Thereafter, I will present our recent work devoted to the selective chemical transformation of waste plastic to new materials with carbon capture properties.

For some representative references:

1. L. Gausas, S. K. Kristensen, H. Sun, A. Ahrens, B. S. Donslund, A. T. Lindhardt, T. Skrydstrup, *JACS Au* **2021**, *4*, 517.
2. M. B. Johansen, B. S. Donslund, S. K. Kristensen, A. T. Lindhardt and T. Skrydstrup, *ACS Sustain. Chem. Eng.* **2022**, *10*, 11191.
3. A. Ahrens, A. Bonde, H. Sun, N. K Wittig, H. C. D. Hammershøj, G. M. F. Batista, A. Sommerfeldt, S. Frølich, H. Birkedal and T. Skrydstrup, *Nature* **2023**, *617*, 730.

Biography of presenter:

Academic Experience: Troels Skrydstrup received a BSc degree in chemical engineering from Queen's University, Kingston, Canada (1983) and his MSc and PhD degrees from the Technical University of Denmark (1985 and 1988). After several post-doctoral periods at l'Institut de Chimie des Substances Naturelles, Gif-sur-Yvette, France (1988–89, 1990–92) and at the Carlsberg Laboratories (1989–90), Troels Skrydstrup was employed as a Chargé de Recherche (CR1) in the CNRS both at l'Université d'Orléans and l'Université Paris XI (1992–1997). In 1997, he became Associate Professor at the Department of Chemistry, Aarhus University, and was promoted full Professor of Organic Chemistry in 2002. Currently, he is center leader of the Carbon Dioxide Activation Center at Aarhus University, and the co-director of the Novo Nordisk Foundation CO2 Research Center.

Membership and awards: Troels Skrydstrup was elected as a fellow of the Royal Danish Academy of Sciences in 2008, as member of the Danish Academy of Natural Sciences in 2010, and the Danish Academy of Technical Sciences in 2015. He was knighted by the Danish Queen in 2012. In 2001, he received the Holm's Research Prize. In 2018, he was awarded the Melvin Calvin Award 2018 for outstanding scientific contributions in the field of isotope science, and the same year the Science Award from the Faculty of Science and Technology, Aarhus University. In 2022, he received the Bjerrum, Brønsted, Lang award. Troels Skrydstrup has been visiting professor at l'Université de Versailles (2001), Osaka Prefecture University (2007), l'Université Paris Decartes (2008), Nanyang Technological University, Singapore (2013), l'Université de Bordeaux (2014) and Nanchang University (2018).

Publications: Over 300 publications, H-factor: 63

Research and Innovation: Recent efforts have been focused on the development of innovative isotope labeling techniques, methods for polymer deconstruction and carbon dioxide conversion.