

# High-Throughput Synthesis, Purification, and Application of Alkyne-Functionalized Discrete Oligomers

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## What was achieved?:

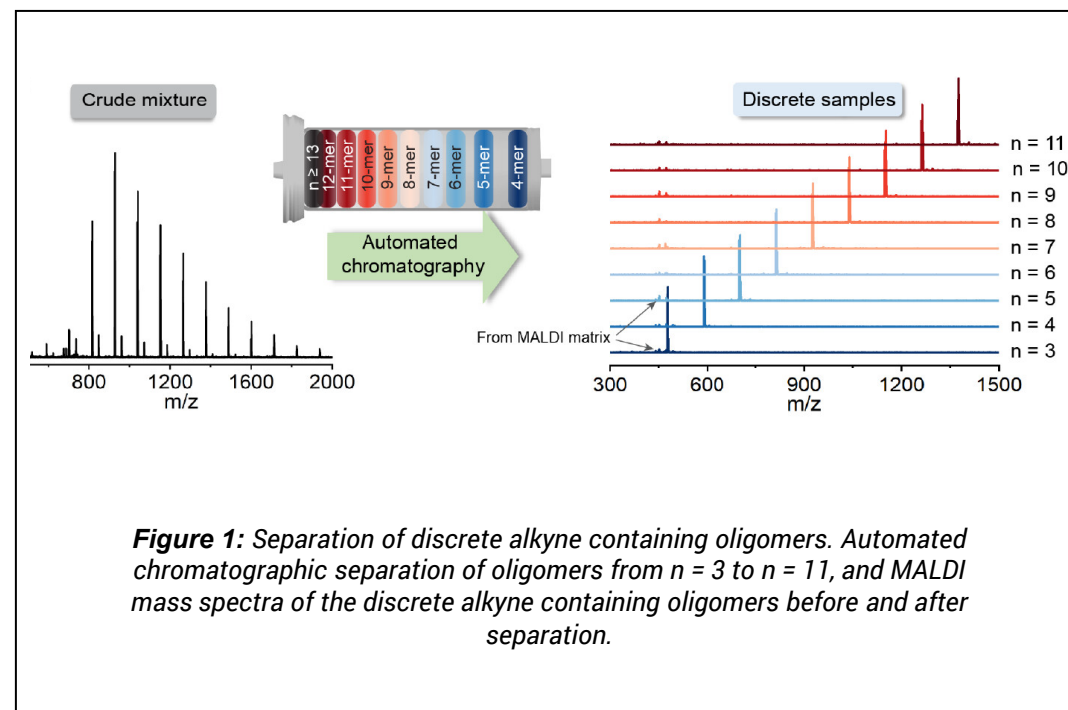
A novel strategy for the synthesis and purification of discrete, highly functionalized oligomer libraries in a 96-well, high-throughput format was developed. Through a combination of living ring-opening polymerization and chromatographic separation, a series of discrete alkyne oligomers with specific degrees of polymerization and varied side chain functionalities were isolated. This approach allowed for the scalable preparation of discrete, multifunctional oligomers leading to significant chemical diversity.

## Why is it important?:

A user-friendly pathway is provided for nonexperts to create libraries of multifunctional discrete oligomers with tailored properties. Immense potential for various biomedical and material applications, such as drug delivery, antimicrobial materials, and gene therapies, is held by these oligomers. The demonstrated enhancement of antibacterial activity and lower toxicity compared to traditional disperse samples underscores the importance of discrete materials in improving therapeutic effectiveness and safety profiles. The ability to precisely control the molecular structure of these oligomers allows for a thorough investigation of chain-length-dependent properties, facilitating advancements in fields like materials science and biology.

## How is this achievement synergistic with BioPACIFIC MIP?

This project used BioPACIFIC MIP's HPLC and Biotage chromatography systems for separation and purification of the oligomers leading to accelerated library creation. This provides a scalable and user-friendly approach to creating discrete molecular structures which will enhance our understanding of structure–activity relationships in polymer science. This project exemplifies BioPACIFIC MIP's mission to facilitate high-throughput accelerated processes, thereby broadening accessibility within the scientific community.



**Figure 1:** Separation of discrete alkyne containing oligomers. Automated chromatographic separation of oligomers from  $n = 3$  to  $n = 11$ , and MALDI mass spectra of the discrete alkyne containing oligomers before and after separation.

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