

# Synthesis and functionalization of step-growth polymers prepared by the A<sup>3</sup> multi-component coupling reaction

Dimitrios Giannopoulos<sup>a</sup>, Leandros Zorba<sup>a</sup>, Christos Zisis<sup>b</sup>, Marinos Pitsikalis\*<sup>b</sup> and Georgios C. Vougioukalakis\*<sup>a</sup>

<sup>a</sup>Laboratory of Organic Chemistry, Department of Chemistry, National and Kapodistrian University of Athens, Zografou GR-15771, Greece

<sup>b</sup>Laboratory of Polymers, Department of Chemistry, National and Kapodistrian University of Athens, Zografou GR-15771, Greece

e-mail: [jim97giann@gmail.com](mailto:jim97giann@gmail.com)

Multicomponent reactions offer a streamlined method for synthesizing organic compounds in a one-pot manner. The A<sup>3</sup> or KA<sup>2</sup> coupling of aldehydes or ketones with amines and alkynes is an efficient route to propargylamines, compounds with diverse chemical properties.<sup>1</sup> Extending this strategy to polymer synthesis enables the production of polymers with varied properties and applications. This study presents a sustainable, air-tolerant approach for synthesizing novel polymeric propargylamines using a highly-reactive, widely available copper catalyst, yielding excellent results.<sup>2</sup> The post-functionalization of polymers is vital for developing functional materials. Our work further explores two post-functionalization strategies of A<sup>3</sup> polymeric propargylamines to create poly-electrolytes and diverse polymeric structures with unique physical and chemical characteristics.<sup>3</sup>

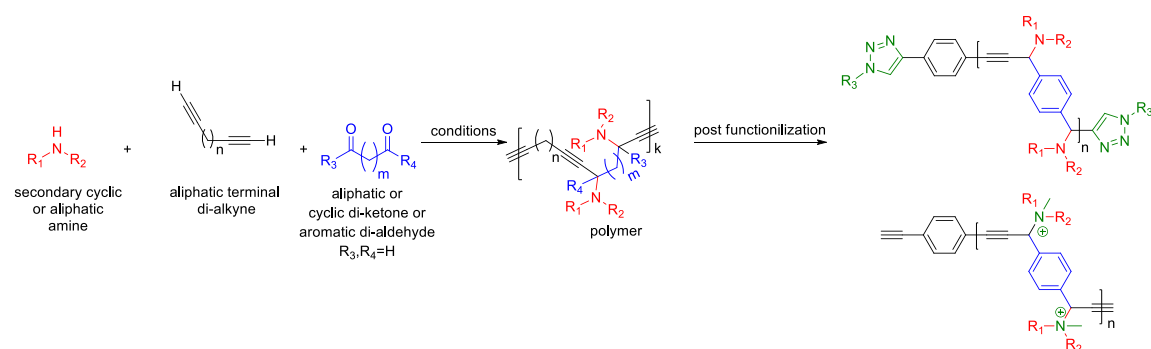


Figure: Step-growth polymerization reaction and post functionalization strategies.

## References:

1. Zorba, L. P.; Vougioukalakis, G. C. *Coord. Chem. Rev.* **2021**, *429*, 213603.
2. Giannopoulos, D. K.; Zorba, L. P.; Zisis, C.; Pitsikalis, M.; Vougioukalakis, G. C. *Eur. Polym. J.* **2023**, *191* (March), 112056.
3. a) Johansson, J. R.; Beke-Somfai, T.; Said Stålsmeden, A.; Kann, N. *Chem. Rev.* **2016**, *116* (23), 14726–14768. b) Johansson, J. R.; Beke-Somfai, T.; Said Stålsmeden, A.; Kann, N. *Chem. Rev.* **2016**, *116* (23), 14726–14768.

The research project was supported by the Hellenic Foundation for Research and Innovation (H.F.R.I.) under the “1st Call for H.F.R.I. Research Projects to support Faculty Members & Researchers and the procurement of high-cost research equipment grant” (Project Number: 16).