

FORMULATION OF BIOBASED COPOLYMERS AS EMULSIFIERS

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Résumé :

The global production of petro-based polymers currently exceeds 400 million tons per year, raising increasing concerns about their environmental impact and driving interest in sustainable alternatives. In response, bio-based materials derived from renewable resources have emerged as promising candidates [1]. Within this framework, Roquette aims to replace conventional petro-sourced emulsifiers with starch-derived compounds. Among them, isosorbide, a bio-based platform molecule obtained by the double dehydration of sorbitol, stands out due to its versatility in substituting petroleum-derived materials. We have demonstrated that poly(isosorbide monomethacrylate)s (PIMMAs) are hydrophobic bio-based polymers with a limited solubility in water of around 5 g·L⁻¹ [2-3]. In contrast, poly(ethylene glycol) (PEG) is a well-known hydrophilic, non-ionic polymer that exhibits stealth behavior [4]. To design a polymeric emulsifier, a PEG macro chain transfer agent (CTA) was synthesized, and further used to join PIMMA and PEG into di-block copolymers by Radical Addition Fragmentation chain Transfer (RAFT) polymerization.

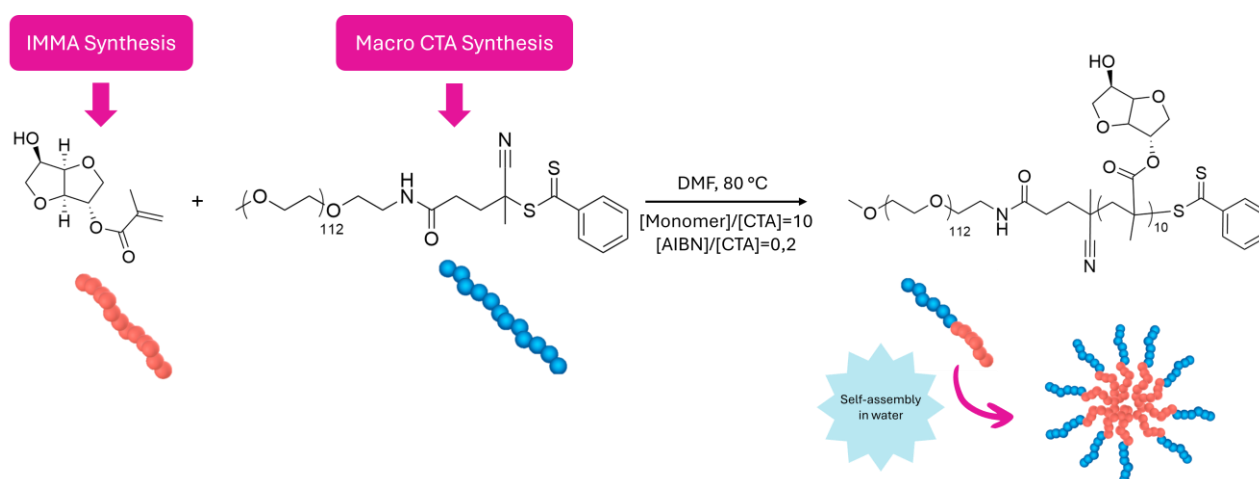


Figure 1. Graphical abstract.

Références :

- [1] : G. Hayes, M. Laurel, D. MacKinnon, T. Zhao, H. A. Houck, C. Remzi Becer, Chemical Reviews, 2023, **123**, 2609-2734
- [2] : F. Aricò, Curr. Opin. Green Sustain. Chem. 2020, **21**, 82-88
- [3] : C. Dussenne, T. Delaunay, V. Wiatz, H. Wyart, I. Suisse, M. Sauthier, Green Chem. 2017, **19** (22), 5332–5344.
- [4] : K. Knop, Angewandte Chemie International Edition, **49**(36), pp. 6288–6308