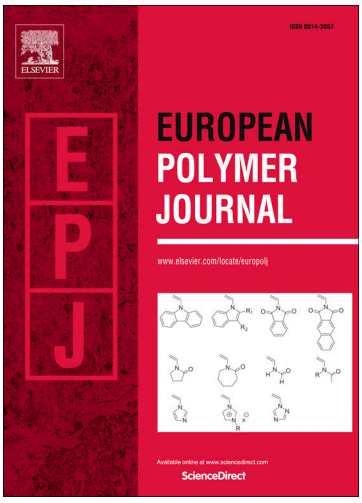

Data storage in sequence-defined macromolecules *via* multicomponent reactions

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PII: S0014-3057(18)30530-5
DOI: https://doi.org/10.1016/j.eurpolymj.2018.04.038
Reference: EPJ 8394

To appear in: *European Polymer Journal*

Received Date: 16 March 2018
Revised Date: 23 April 2018
Accepted Date: 26 April 2018

Please cite this article as: Boukis, A.C., Meier, M.A.R., Data storage in sequence-defined macromolecules *via* multicomponent reactions, *European Polymer Journal* (2018), doi: https://doi.org/10.1016/j.eurpolymj.2018.04.038

Data storage in sequence-defined macromolecules *via* multicomponent reactions

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Abstract

Sequence-defined and information coding macromolecules suitable for data storage materials were synthesized *via* a combination of two multicomponent reactions. Thus, a well-established protocol based on the Passerini reaction was combined for the first time with the Biginelli reaction for monomer synthesis to explore new sequence-defined materials by exploiting the high structural variety of two multicomponent reactions. The information was encoded *via* the variation of six different components per repeating unit choosing from a list of more than 100 components that can potentially be applied. The structural variety of the oligomers that can achieved using this approach offers an information density of up to 24 bits per repeat unit. The information was read out *via* tandem mass spectrometry, wherein the predominant fragmentation processes were identified and subsequently applied for reading out the information contained within several macromolecules, *i.e.* by sequencing and re-establishing the structure of these macromolecules.

Highlights

- A data storage concept utilizing multicomponent reactions is established
- Two multicomponent reactions were utilized to synthesize a library of monomers
- Each monomer can encode 24 bits of information
- Sequence-defined macromolecules encoding ~100 bit each were synthesized
- The information was read *via* ESI-MS/MS using distinct fragmentation pathways

Keywords