Renewable hydroxyurethane vitrimers for sustainable additive manufacturing

Louis Moussi[1,2], Paul Morandi[1,2], Vincent S.D. Voet[2], Rudy Folkserma[2], Katja Loos[1]

[1]Macromolecular Chemistry & New Polymeric Materials, Zernike Institute for Advanced Materials, University of Groningen, Groningen, The Netherlands

[2]Circular Plastics, Academy Tech & Design, NHL Stenden University of Applied Sciences, Emmen, The Netherlands

Email: l.m.moussi@rug.nl

I/ Context

Commercial resins are **fossil based** and lack sustainability [2]

Renewable feedstocks can be used to improve the **renewability** of formulations [1]

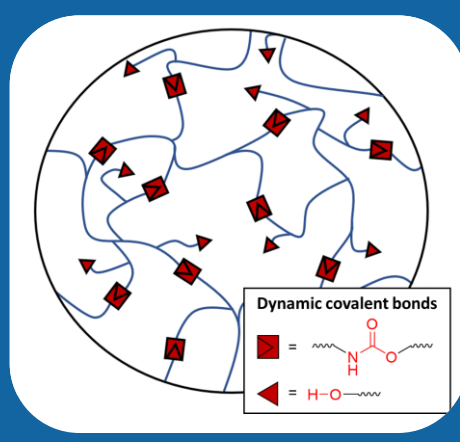
Vat photopolymerization (VP) expected to play an important role in industry [1]

Printed products lack **recyclability** and usually end up **incinerated or landfilled** [2]

Vitrimer materials can be used to improve the **recyclability** of printed products [3]

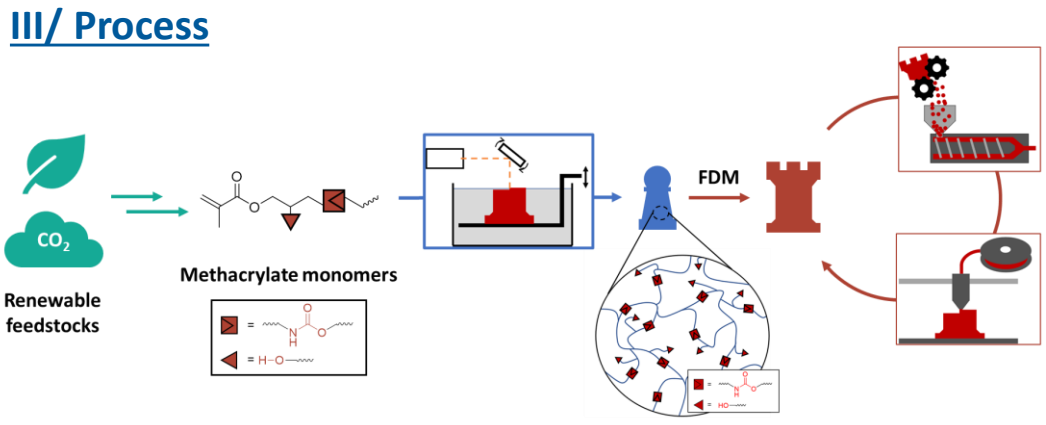
II/ Objectives

- Synthesize printable monomers from **renewable feedstocks**
- Develop formulations that can be printed into **recyclable vitrimers** via VP
- Create a **closed-loop** recycling process with **Fused Deposition Modelling** (FDM)

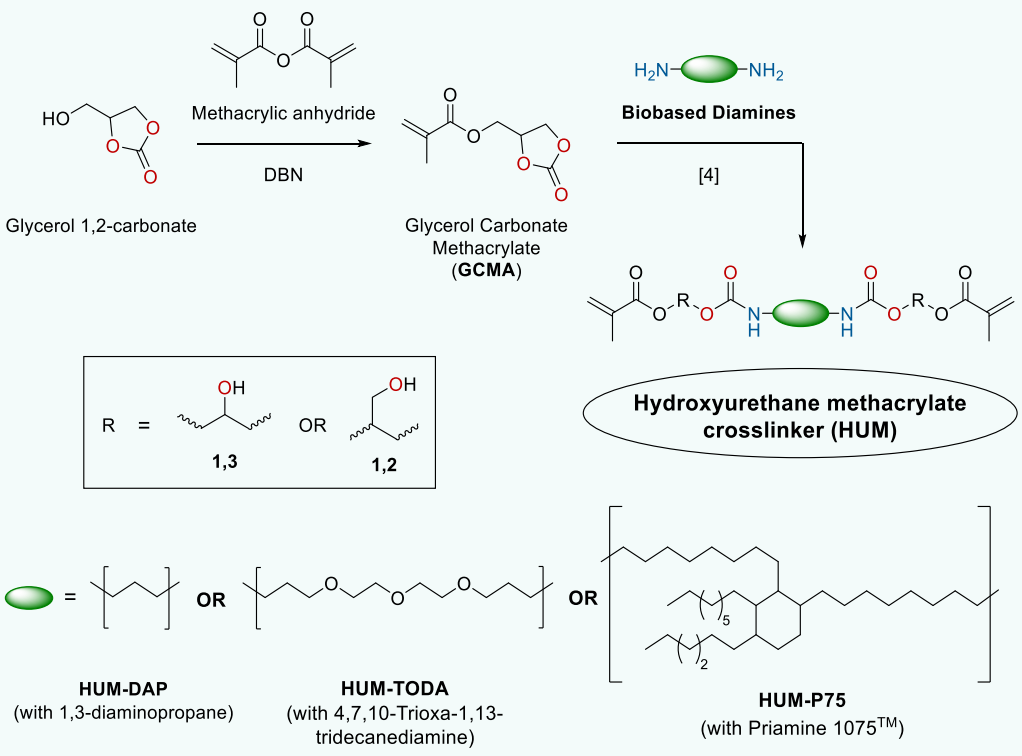


Hydroxyurethane vitrimer network

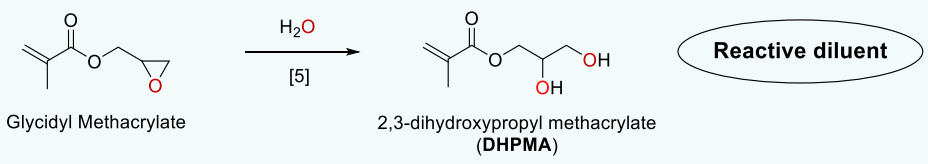
III/ Process



1.a. Hydroxyurethane methacrylate crosslinker synthesis:

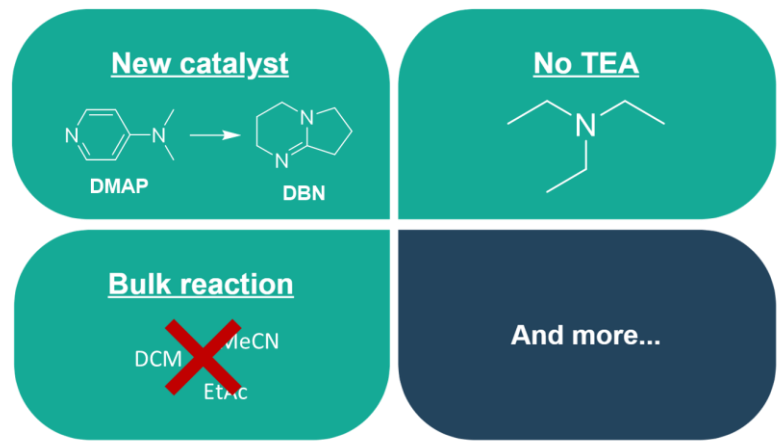


1.b Reactive diluent synthesis:

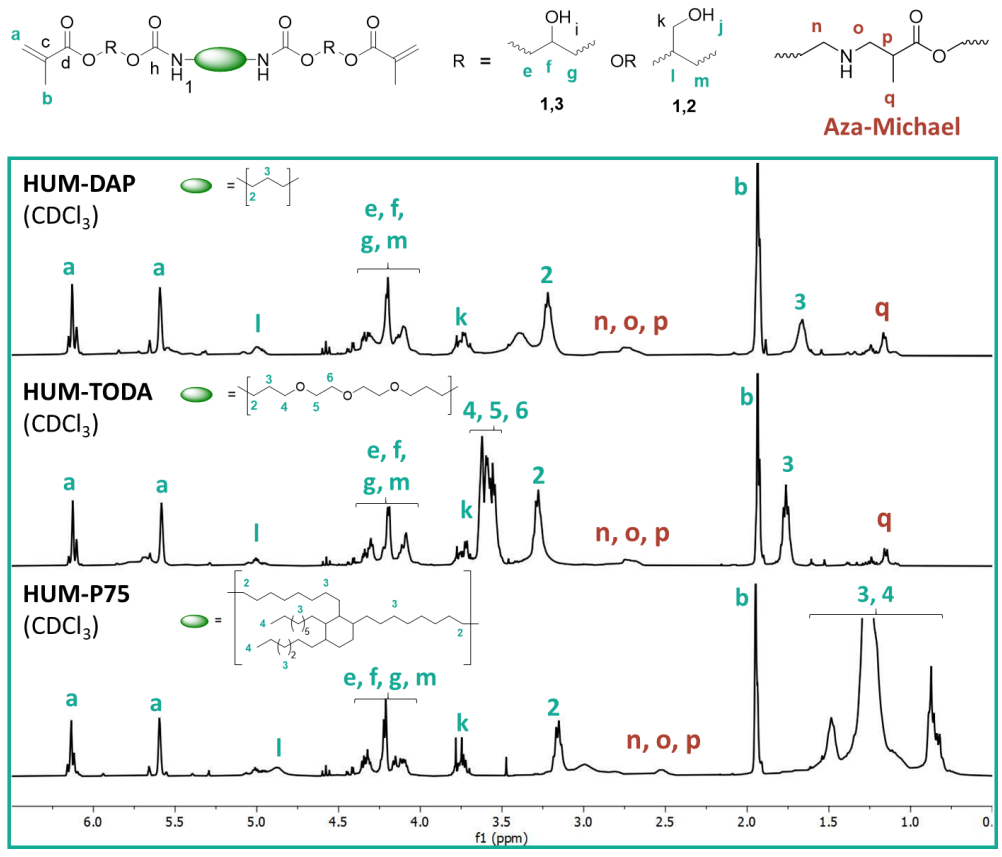


IV/ Improving sustainability*

*To be confirmed with an LCA



V/ Progress



VI/ Expected outcomes

1. **Printable** vitrimers capable of **transcarbamoylation bond exchange reactions** [6]
2. **Tunable** mechanical and dynamic **properties** using various **crosslinkers and compositions** [7]
3. **Improved reprocessing capabilities** through **catalyst** and **additional free hydroxyl moieties** [6]

References

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