

Session: Novel polymers
Presentation by: Bram Fieten, Wydo NBD B.V.

Title: **Performance materials from itaconic acid and methacrylic acid**

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Curriculum:

Bram Fieten, already 15 years working in innovation trajectories and product development in the polymer industry. The last 5 years he is project portfolio responsible for the New Business Development of Van Wijhe Verf, these activities are now separated in a separate entity Wydo NBD. Bram is responsible for project choices, creating a network and finding partners for the development routes that fit the strategy of Wydo NBD. The main focus of Wydo NBD is on projects clustered around UV technology and so called Safe Paints in which the aim is to use non-hazardous and biobased raw materials for making high quality paints. In short, bringing innovation to practise requires change larger than just the product development. The new setup enables Van Wijhe to improve and optimise its existing portfolio and via Wydo NBD maximum flexibility is given to shape New Businesses that are different. Bram Fieten has a background in Chemical Engineering and had his first job at DSM Composite Resins. After 7 years in several positions he moved to a project in China where in cooperation with BUEFA the industrial glue portfolio was introduced, that for example was used in the windmill industry. After finishing this project he joined Van Wijhe to realize the New Business ambitions.

Abstract:

Van Wijhe Verf has the ambition to be frontrunner in the use of biobased raw materials for coatings. The initial step was in 2013 by introducing an interior wall paint based on starch technology. To go further on this route, increasing biobased contents with high quality performance the challenge is not only technology, but also scale and definition. When using a biobased source, possible scale and effect of such scale should be taken into account. This makes the BPM Methaform project an important opportunity for taking next steps in biobased raw materials. The first evaluated lab samples show promising results with significant biobased content. Having the flexibility of Wydo NBD on the side makes that we are optimistic on the change of success for this project.

Performance materials from itaconic acid and methacrylic acid

- Biobased performance materials symposium – 14th of June 2018
- Bram Fieten





**VAN
WIJHE
VERF**

EST. 1916



Royal Van Wijhe Verf: It all started in 1916

- Established in 1916 as a wholesaler, the company evolved into the largest independent decorative paint producer in The Netherlands
- The brand Wijzonol is the third largest player in the Netherlands after Akzo and PPG
- 4th generation Family Business
- Turnover circa 45M Euro and 200+ employees
- Global presence, 30% export to 26 countries
- Motto:
“There will be no modern sustainable future without innovation”



Wydo New Business Development

- Wydo NBD was founded in 2016 to add a dedicated company (startup) to the family business to grow sustainable business.
- Capability to translate academic ideas to tangible products to fulfil customer needs
- Young Wydo NBD already has 2 patents in progress
- Sustainable innovations with impact

Mission	Vision	Ambition
Impact on a sustainable world on the basis of continuous innovations.	Develop a new standard to achieve sustainable business management.	In partnership with partners, generate at least 5 sustainable, innovative solutions that are commercially viable.

Wydo development roadmaps



UV

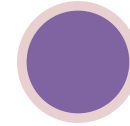
UV curing coatings:

- Instant use
- Rapid curing
- Ultra low emission



Safe Paints

- Biobased technology
- Safe raw materials
- Coatings for clean environments



Color paste

- Custom made tinting systems
- Biobased technology
- Low emission systems



Methaform project - background

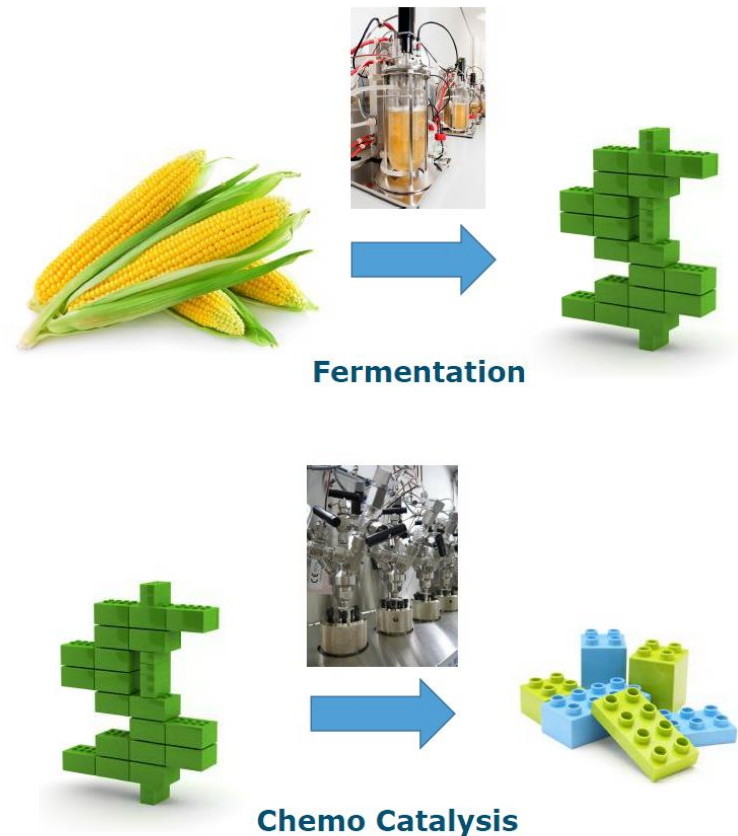
Acrylate and methacrylate esters are important monomers for the coatings and adhesives industry. Polyacrylate polymers are an essential ingredient in many of the current water borne coatings and paint formulations, including wall paints. The introduction of water borne paints has led to a vast reduction in VOC (volatile organic components) emissions. Nevertheless, acrylate binders are still produced from petrochemical feedstocks. Hence, there is a growing demand for biobased acrylate resins that combine the environmental benefits of water borne coatings, with the use of sustainable, renewable feedstocks.

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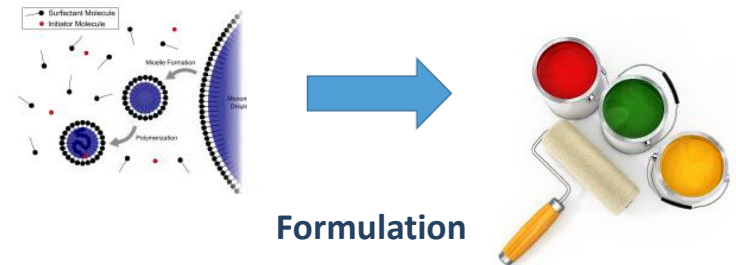
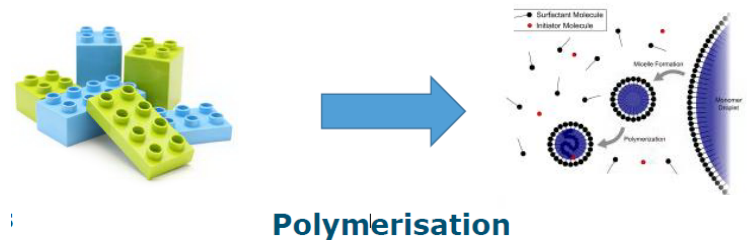
Methaform project - approach

- Archer Daniels Midland Company (ADM) has supplied consortium partners with itaconic acid and alcohols, obtained by fermentation of sugars.
- ADM and WFBR have generated new insights in the reaction mechanisms for converting itaconic acid into methacrylic acid under green chemistry conditions. As a result the use of expensive and scarce noble metal catalysts is no longer required.
- Furthermore WFBR is successfully developing new chemo-catalytic routes for the selective conversion of citric acid tot itaconicacid under mild conditions.



Methaform project - approach

- WFBR has synthesized a range of itaconic acid esters on bench scale, which made it possible to produce a broad range of itaconic acid based emulsion polymers. This has generated a new toolbox for producing latexes with specific properties.
- Van WijheVerf is evaluating these new biobased resins in their water borne products and systems.
- Furthermore, EOC Belgium is evaluating biobased itaconic acid obtained from fermentation in emulsion polymerization, with the aim to produce resins for water borne coating system.



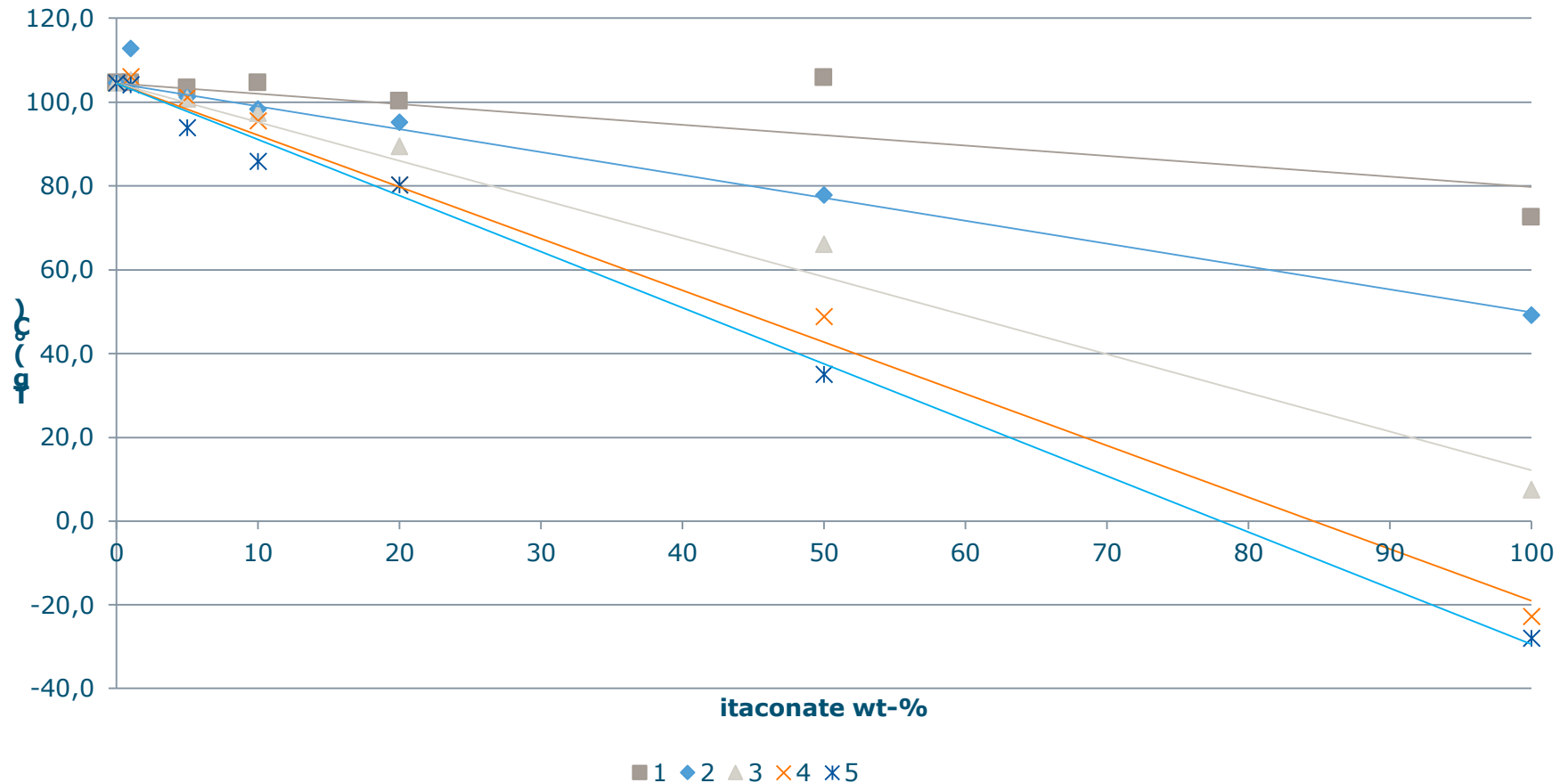
Small scale bulk emulsion polymerisation

- 2 L scale fed-batch emulsion polymerization set-up



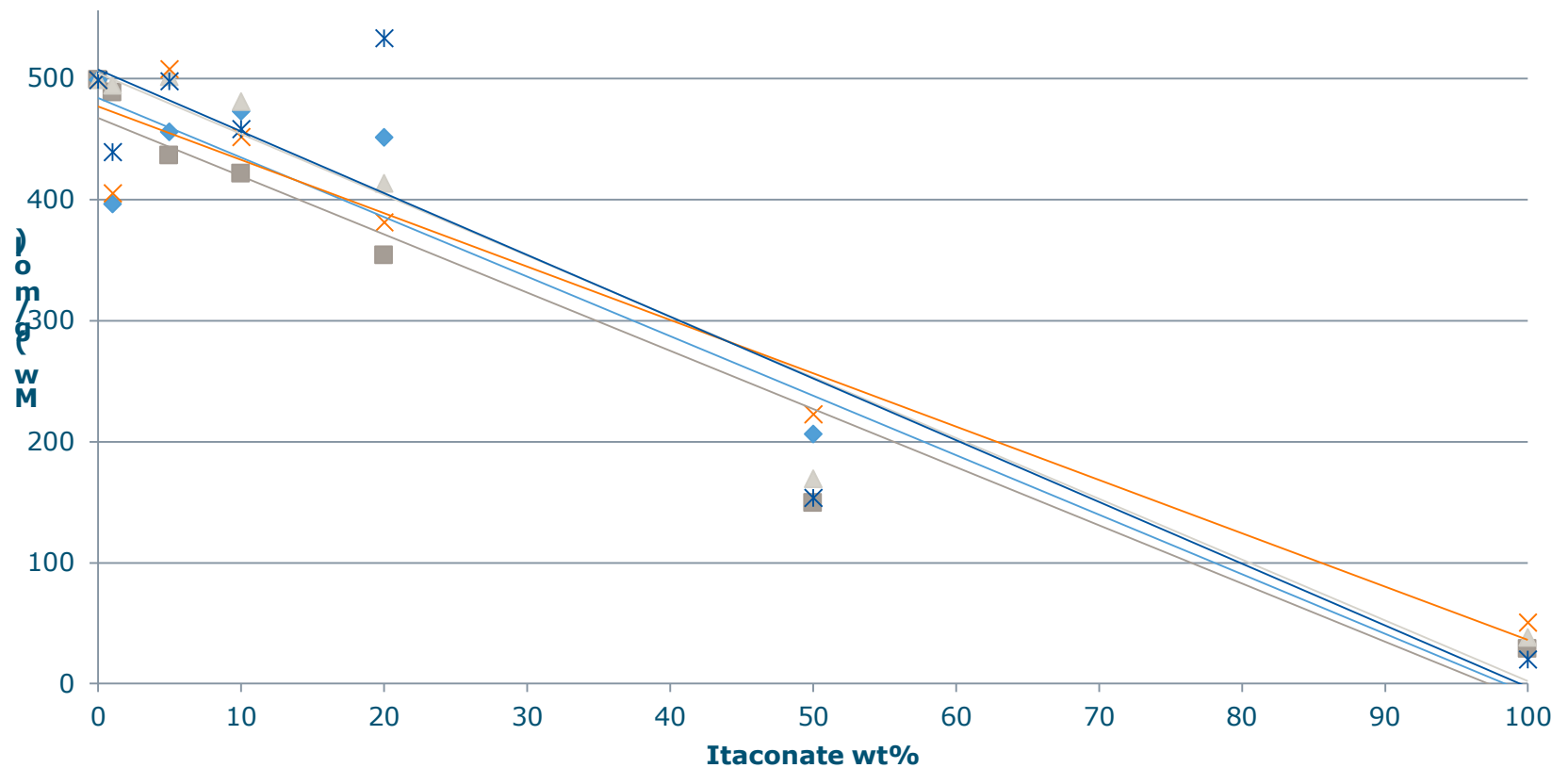
Effect of (co)monomer

○ Toolbox: tuneable T_g by varying composition



Effect of (co)monomer

- Toolbox: tuneable molar mass by varying composition



Methaform project – coating results

- Prototype binders from WFBR are screened
- >50% Biobased content is possible
- High quality coating films can be made
- Binder stability optimisation needed
- Sensitivity towards co-solvents and other common coating ingredients

Methaform project – Wydo outlook

- Speed up R&D optimisation phase
- Team up in a scale-up scenario
- Introduce a next generation biobased coatings (wall paints and lacquers)
- Transparency in biobased, introduce products that are standardized using EN16575
- **→ Determine a challenging but realistic timeline !!**



WYDO

ACCELERATE YOUR IMPACT