ATIPIC and BPG co-organize a workshop on the interface of their respective activities

" Where Polymers Meet Coatings "

October 7th, 2021 at Brabanthal, Leuven

Program

13:30 - Welcome – Coffee/Tea

14:00 - Session opening by Dr. Jacques Warnon – President ATIPIC

Session 1: Chairman Professor Jean-François Gohy.

14:05 - **Ashish Raj** - *IMCN – UCLouvain (BE)*
" Bio-based solid electrolytes based on poly(hydroxyurethanes) bearing cyclic carbonates for solid-state lithium batteries".

14:40 - **Dr. Jonathan Potier -** *Univ-lille(FR)*
" Isosorbide monoacrylate: a sustainable monomer for the production of fully bio-based polyacrylates and thermosets".

15:15 - Coffee / Tea break.

Session 2: Chairman Dr. Jacques Warnon – President ATIPIC

15:30 - **Dr. Silfredo Bohorquez -** *Allnex (NL)*
" Assessing the performance of fructose–based electrosterically stabilized latexes in decorative paints".

16:05 - **Dr. Ad Overbeek** or **co-author** - *DSM-Covestro (NL)*
" Begnin and Efficient crosslinking Polymeric aziridines provide a unique combination of safety and performance".

16:40 - Closure and after drink.

Abstracts

- **"Bio-based solid electrolytes based on poly(hydroxyurethan bearing cyclic carbonates for solid-state lithium batteries".**

Ashish Raj Satyannarayana Panchireddy, Bruno Grignard, Christophe Detrembleur, Jean-Francois Gohy* – *UCLouvain (BE)*

Climate change is a harsh but ultimate reality that is impacting every corner of the globe. This stresses the strong emphasis on the need for clean renewable energy with safe storage technology particularly batteries. Solid-state batteries are of great interest owing to their higher energy density, flexibility and safety than the existing lithium-ion batteries technology. While there are constantly increasing research on polyethylene oxide (PEO) based polymers, we aim at PEO alternatives that are sustainable and environmentally friendly. In our project, we demonstrate a bio-based solid-state electrolyte based on functionalized carbonated soybean oil (CSBO) obtained from the naturally occurring epoxidized soybean oil (ESBO) using CO_2 and biomass. As a next step, different analogues of Polyhydroxy Urethanes (PHUs) has been synthesized with multiple chain length polyethylene diamine (PEGDA). This class of materials shows remarkable adhesive properties to the surface of lithium speculating better interfacial contact and stability. LiTFSI salt reinforced CSBO and PHUs were characterized following standard electrochemical measurements exhibiting decent ionic conductivity, electrochemical stability window and transport properties allowing it to be explored for high voltage cathodes like $LiFePO_4$. PHUs have been widely looked upon in the paint industry, although their multifunctional properties open their utilization in other domains of research including energy storage. We hope to provide a promising direction of developing bio-based solid electrolytes to facilitate progress in sustainability, cost-effective and safe manner to create a solid-state lithium battery for global utilization.

- **"Isosorbide monoacrylate: a sustainable monomer for the production of fully bio-based polyacrylates and thermosets".**

Florine Nonque[a,b], Audrey Sahut[b], Nicolas Jacquel[b], René Saint-Loup[b], Patrice Woisel[a] and Jonathan Potier[a] - *Univ-lille(FR)*

Bio-based polymers and materials continue to be extremely investigated to substitute their petro-based counterpart in myriad of applications. In this context, isosorbide is without any doubt the most used sustainable product.[1] Indeed, this starch derivative has already proven to be an excellent precursor for the formation of high-performance polymers thanks to its rigid bicyclic structure.[2] However, even if isosorbide has the particularity to contain two secondary alcohols in *endo* or *exo* position displaying different reactivities, [3] the vast majority of the polymers developed contain isosorbide in their main chains. This type of structure prevents post-modifications such as the formation of 3-D networks or the incorporation of other functions of interest.

In this work we present the study on radical polymerization of bio-based isosorbide monoacrylate (IMA) for the production of fully sustainable polymers. This study, based on the determination of chain transfer constants using the Mayo method, highlighted the key role of monomer and solvent transfer reactions for controlling molecular weight of PIMA and finally obtaining high performance thermosets.[4]

- **“Assessing the performance of fructose–based electrosterically stabilized latexes in decorative paints”.**

J. S. Desport[1], S. J. Bohórquez[2], D. Mestach[2], M. J. Barandiaran[1] – *Allnex (NL)*

Emulsion polymers are widely used as film-forming materials for coatings. These systems are composed of hydrophobic particles dispersed in aqueous media, which are thermodynamically unstable, hence, stabilizers are employed to provide kinetic stability. Being either anionic or non-ionic, conventional surfactants tend to negatively impact film properties, essentially because of their weak interaction with the polymer phase. In contrast, macromolecular stabilizers, namely alkali soluble resins (ASRs) provide strong adsorption onto polymer particles and typically overcome surfactant migration-related issues.

ASRs are random or block copolymers of low molecular weight (Mw < 20,000 g/mol) composed by acrylic and carboxylic acid-containing monomers. The efficiency of ASRs as electrostatic stabilizers in emulsion poly

merization processes stems from their pH-dependant solubility, which allows controlled aggregation phenomena in solution. ASRs have been widely used by the industry ever since the early 70’s. Yet, their composition tends to remain standard despite of the growing interest for renewable alternatives, which has led both politicians and consumers to raise concerns about commercial products sustainability.

Among available renewable resources, sugars are receiving interest from the chemical industry. Indeed, large amounts of carbohydrates are commercially available in the food industry but a substantial part of it is regrettably wasted as a surplus of their agricultural production or through domestic food wastage.

In this work, a fructose-based monomer, bearing a methacrylic group (MF) was selected to be copolymerized in two processes involving ASRs [1]. Both resulting products consisted of a hard phase (ASR shell) and a softer core polymer particle phase. The petroleum-based methyl methacrylate (MMA) was incrementally substituted by MF in both phases. The two methacrylate monomers exhibit comparable glass transition temperatures, namely 110 °C for MMA and 115 °C for MF [2,3].

Ultimately, up to 100 wt% of MMA was replaced in the formulation of two types of ASR-stabilized products. Binders with bio-contents of up to 45 wt% - based on total monomer content - were produced and formulated for a clear coat application. Their performance in terms of hardness, gloss, haze and chemical resistance were found to be comparable to a commercial waterborne clear-coat. The results emphasized the relevance of using alternative feedstocks, here monosaccharide, for the preparation of more sustainable products.

- **"Begnin and Efficient crosslinking Polymeric aziridines provide a unique combination of safety and performance”.**

Ad.Overbeek - *DSM-Covestro (NL)*

Polymeric aziridines will be presented as a new class of crosslinkers for waterborne coatings. They have a much-improved toxicological profile compared to conventional aziridines and labelling is now more comparable to carbodiimides.

Performance benefits, like a much longer potlife and an improved ‘value in use’, will be compared to conventional aziridines and carbodiimides. Also the rate and the efficiency of crosslinking, as well as the influence of the hydrophilic modification of the crosslinkers on water miscibility and final performance, will be shown. Finally, the effect on the properties of different types of coatings will be presented.

Registration fees

ATIPIC/BPG member:	FREE
AFTPVA/NVVT member:	25,00 EUR (VAT incl.
Non ATIPIC/BPG/AFTPVA/NVVT member:	50,00 EUR (VAT incl.)
Student:	FREE
Speaker:	FREE

The cash payment has to be done at the entrance of the conference room.

For practical reasons neither cheques nor credit cards will be accepted.

Registration & Cancelling

Registrations are to be made at the latest **by September 28th, 2021** and exclusively by completing the registration form on the ATIPIC website www.atipic.be
To cancel your registration please contact ATIPIC secretariat by mail info@atipic.be at the latest by October 1st 2021.
Any canceling after this date will induce the sending of an invoice for the mentioned amount on the fill-in registration form.

ATIPIC and BPG managements are looking forward to meeting you on October 7th, 2021.

Next ATIPIC events in 2021

October 2nd , 2021: ATIPIC Relax (for members only)
December 2nd , 2021 : ATIPIC / AFTPVA Technical day.

ATIPIC Management

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About ATIPIC and BPG

ATIPIC (The Belgian Association of Technicians from the Paint and Allied Industries)
Objectives :
To promote the spirit and scientific methodology in all these allied industries.
To develop contacts and exchange of ideas, experience and knowledge among its members.
To contribute to the continuous learning and training of its members.

BPG (Belgian Polymer Group)
Objectives:
To provide a forum for the exchange of information on the newest trends in polymer science and technology.
To stimulate fundamental research activities and co-operations between industry and university.

To give junior scientists (graduate students, Ph.D. students, Postdocs) opportunities to establish contacts with other universities and with the industry to build up experience in the presentation of their works.

Brabanthal → ***Room Terra***
Brabantlaan 1
3001 Leuven
Belgium
☎ +32 16 38 30 11
+32 16 38 30 10
E-mail : info@ brabanthal.be
WEB web site: https://www.brabanthal.be/

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