Comment éviter que l'Imprimé ne perturbe le Recyclage des Emballages ?

Commission Recyclage ProHélio

09/03/2023 - Beaune

Color & Comfort

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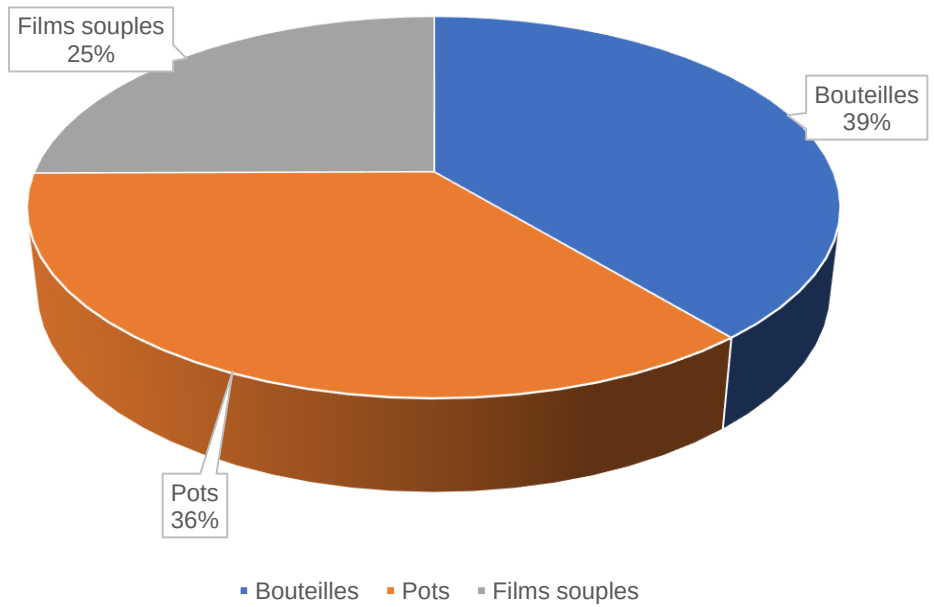
Agenda

- ❑ Les différents types d’emballages
- ❑ Les tendances du marché
- ❑ Recyclage sans encres
- ❑ Recyclage avec encres
- ❑ Les composants qui perturbent le recyclage
- ❑ Le compostage
- ❑ Conclusions

Les différents types d'emballages plastiques mis sur le marché en France (source CITEO)

Bouteilles et flacons en PET clair	245 000 tonnes
Bouteilles et flacons en PET coloré	55 000 tonnes
Bouteilles en PE et PP	135 000 tonnes
Pots et barquettes PET	60 à 65 000 tonnes
Pots et barquettes PE et PP	110 à 125 000 tonnes
Pots et barquettes PS et PSE	115 à 125 000 tonnes
Autres pots et barquettes	70 à 85 000 tonnes
Films et souples en PE	120 000 tonnes
Autres films et souples	160 000 tonnes

Emballages Plastiques (source CITEO)



Source CITEO (2019) – L'emballage plastique souple représente 25% des volumes globaux d'emballages plastiques mis sur le marché – Combien arrivent dans la bonne filière de recyclage ?

Les tendances du marché – Point de vue Packaging

- Transfert de Plastique à Papier
- Transfert de Triplex/Quadruplex à Duplex (PE/PE or PP/PP)
- Transfert de complexe à mono-film
- Réduction de l'Empreinte Carbone
- Introduction de Matières Premières recyclées (PET, PP, PE, Papier)

Warning : L'aspect réglementaire et la protection des aliments demeurent la priorité des marques/donneurs d'ordres et consommateurs

Les tendances du marché – Point de vue du fabricant d'encres

- Demandes pour des systèmes désencrables (sleeve and labels, direct printing)
- Demandes pour des encres compatibles avec les process de recyclage
- Demandes d'encres bio-sourcées (diminuer Carbon Food Print)
- Demandes d'encres Compostables (emballages souillés)
- Demandes de systèmes (vernis/adhésifs) pour remplacer le PE ou le PLA, EVOH (contingency), Metal sides (oxygen barrier)

Barrier Coating > Bio Based inks > Recycling > Washable > Compostable

Recyclage sans encres
Ou Désencrage

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Recycle Friendly Ink Solutions

Initial applications: sleeve labels for PET bottles and PO shrink collation films. Promising results on other applications

Wash Process:
caustic
(+ optional detergent)
75-85C
agitation

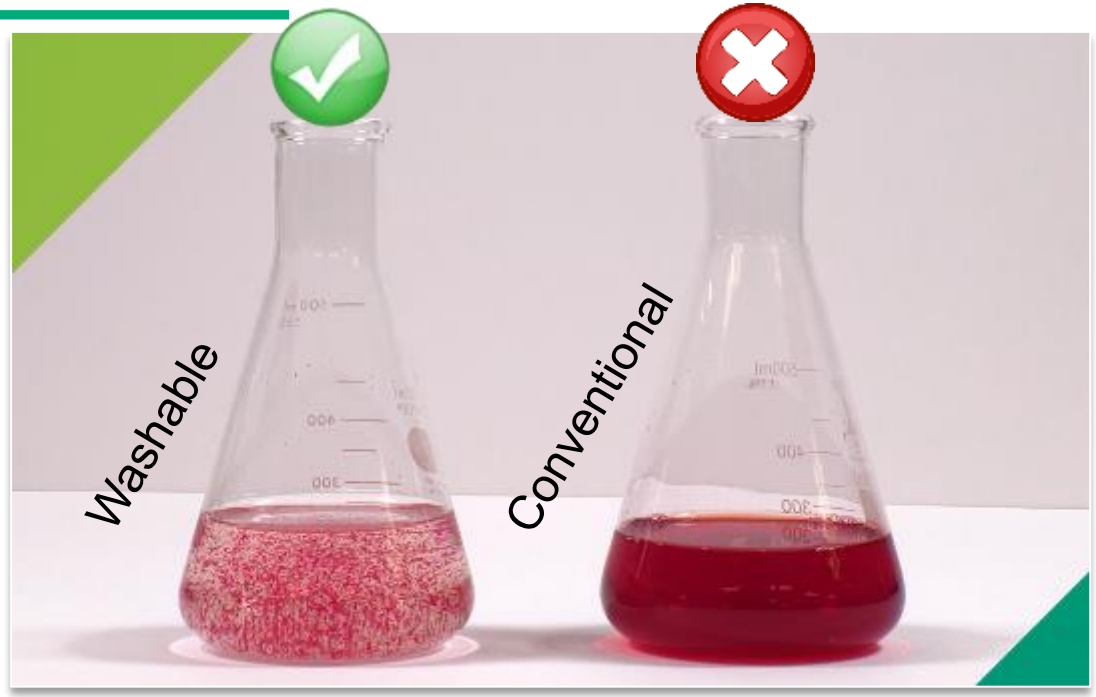
Premium Quality Plastic Flake

Contaminated Wash Solution

Stained Plastic Flake

Direct-Printed, Primer-Free Inks That Are Removed and Separated From Recoverable Plastic Substrates Improve Recyclability of Packaging and Enable Industry Certifications. Higher Quality and Quantity of Plastic Flake is Recovered.

Washable vs. Conventional Inks



Special ink formulation is required to produce filterable non-bleeding ink particles in caustic solution. Resistant pigments and careful resin selections are key.

Washable inks allow filtration of the ink residues, leaving clean plastic flake and clear wash solutions.

https://www.linkedin.com/posts/sun-chemical_sustainable-sunsustainability-solvawash-activity-6887053792051896320-iNIy

Washable Inks Produce Filterable Particles in Caustic, Leaving Solution and Plastic Flake Free of Color. Conventional Inks Stain Solution and Flake.

Recycle-Friendly Ink Solutions for PET and Polyolefin Rigids and Films and Beyond

Primer-Free Solutions

Gen 1 – Gravure
Solvawash GR

- Gravure application
- Achieved APR* recyclability recognition, also passes EPBP test protocol
- Commercially available

Gen 2 – Flexo & Gravure
Solvawash FL/GR

- Flexo and gravure friendly
- Commercially available
- Wide regional compliance
- Extending to other surface-printed films, such as PE for collation

Gen 3 – Energy Curable

- Flexo UV, SolarFlex CRCL commercialized
- EB and wet-trap EB initial tests
- Screen initial market interest

Gen 4 – Water-based

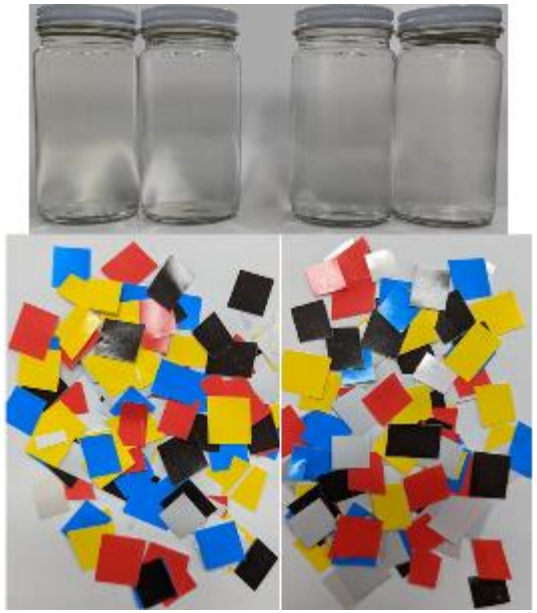
- In final commercial testing

*Note: APR acknowledgement link - https://plasticsrecycling.org/recognition/recipients

Primer-Free Washable Inks for PET or PO Rigids and Films Include Several Product Families. All Meet Recycling Guidelines, and Allow to Increase Yield of High-Quality Post-Consumer Recycled Flake

Retentive Inks for Labels, Sleeves and Beyond

- Association of Plastic Recyclers requires retention for certain systems
- Tuning of the last printed layer – coating or backing white – allows full ink retention
- Solvent-based, UV-curable and water-based products available
- High resistance properties for mono-web labels
- Improves recycling performance
  - Meets Association of Plastic Recyclers (APR) guidelines
  - Protects ink layers from aggressive wash solutions



Systems offers high rub & scuff resistance while preventing ink bleed & staining of plastic flakes during recycling

Recyclage avec encres

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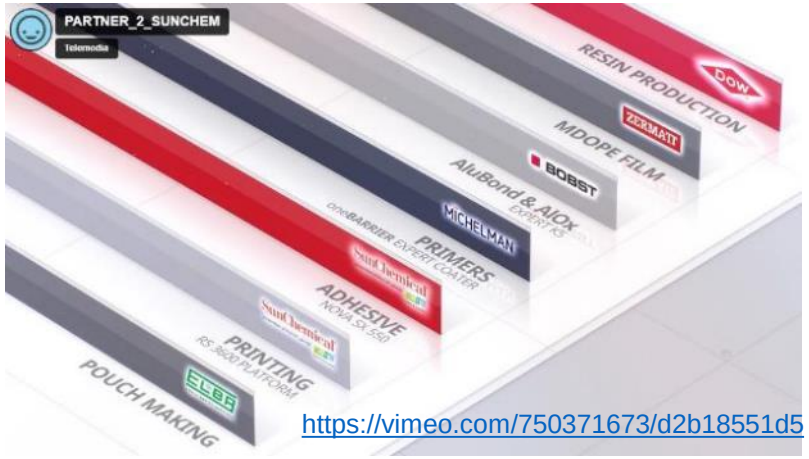
Packaging Solutions – Bobst “OneBarrier” recycling-ready Mono-Material PE

- **Collaboration with Bobst and other partners**
- **Development of “OneBarrier” recycling-ready Mono-Material PE**
- **Showcasing at K 2022 Trade Fair (**Düsseldorf 19–26 October 2022)
  - Internet, media, social media, videos
  - Suppliers’ corner (P Brambilla)
  - Proof of concept pouch samples



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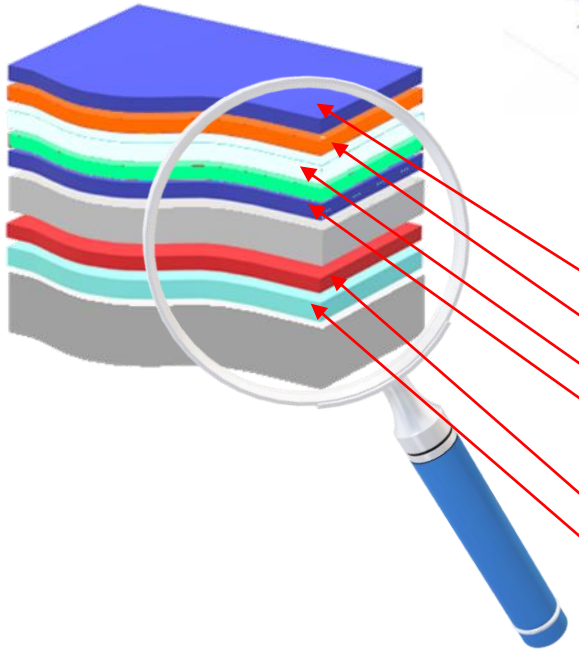


Packaging Solutions, by SunChemical

a member of the DIC group — Color & Comfort

- **Heat Resistant OPV (moisture cure)**
- **PU surface inks – 6 ECG colors**
- **SB White 2K**
- **Primer for MDO-PE**
- MDOPE-Alox
- **SunBar barrier coating**
- **Paslim SF “2-in-1” adhesive**
- LDPE

Sun Chemical is a Packaging Solutions Provider for Flexible Packaging

Mono-material Flexible Packaging (e.g. PE/PE, PP/PP)

Methodik vom bifa Umweltinstitut
MADE FOR RECYCLING
interseroh

very good Recyclability 19 of 20 points

Surface printing

- **Protective/Heat Resistant Coating** (waterbased, solventbased, EB)

Reverse printing

- **OTR/Gaz barrier coating** (SunBar Aerobloc)
- **UV barrier coating** (SunBar UVBloc)
- **NC/PU, PVB/PU, PU solventbased inks**
- **Acrylic waterbased inks**
- **EB curing inks**

Lamination

- **OTR barrier Laminating Adhesives** (SunBar Paslim)
  - **Solvent-free** (up to pasteurization)
  - **Solvent-based** (up to retort, aliphatic, high solid on press)

Customize solutions based on target application which include complete functionalization of mono material package (heat resistance, UV light-gas barrier, mechanical)

Barrier Coatings & Laminating Adhesives

Film & Paper

SunBar™ Aerobloc Oxygen Barrier Coatings

Adds Oxygen Barrier to film, PET, PP, PE, Metalized films, Paper

Protects AlOx treated films from stress cracking

Allow for mono-material film structures

Chlorine free and over-printable with inks

SunBar™ Paslim Oxygen Barrier Laminating Adhesives

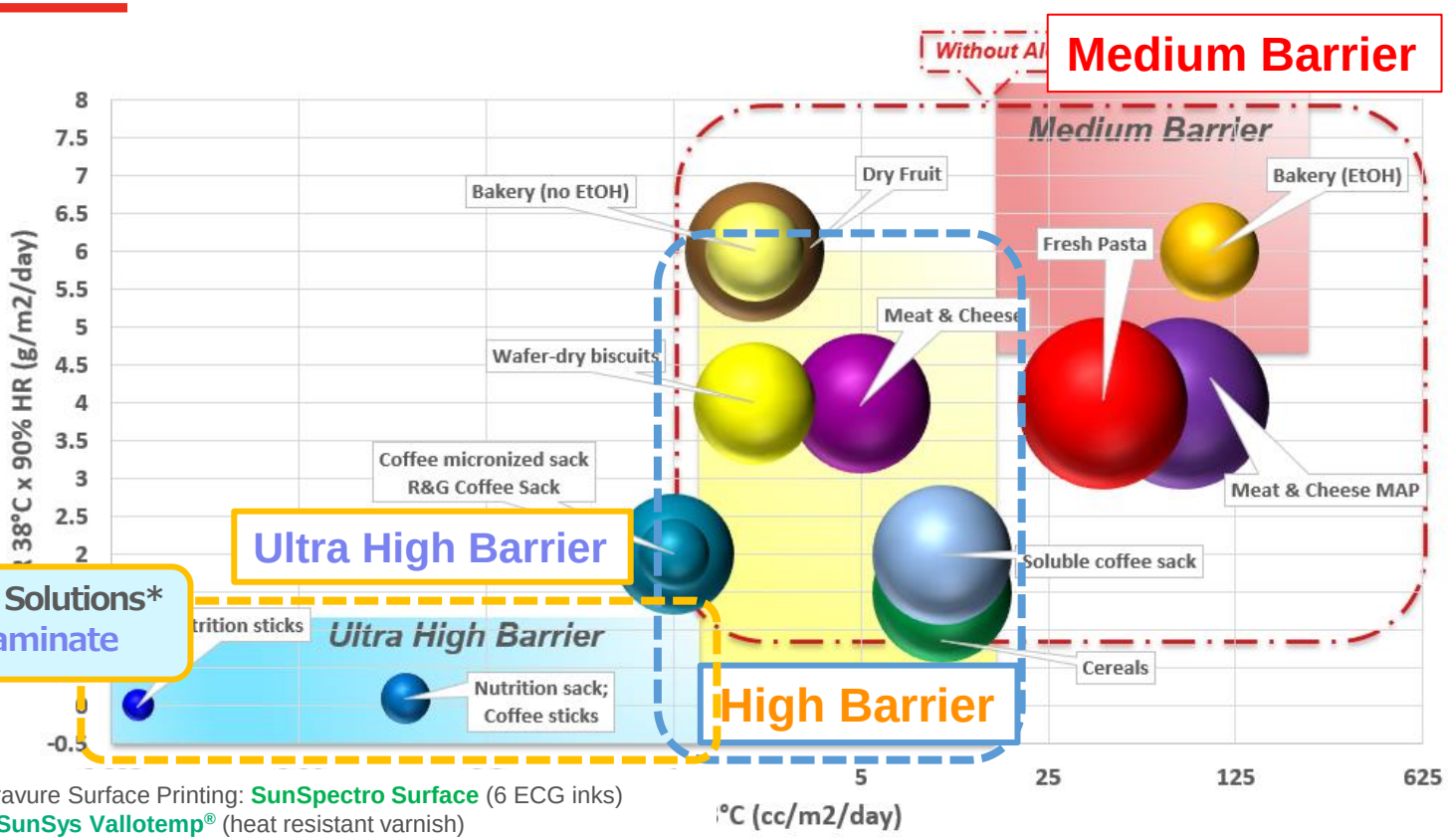
- Combine laminating adhesive with barrier properties

Protects AlOx and Metallization treated films from stress cracking

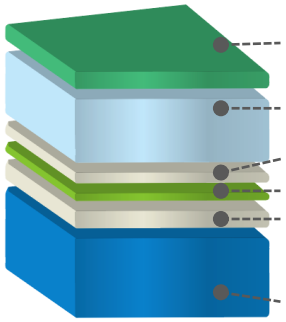
- Allows for the mono-material film structures
- Chlorine free, Epoxy Silane free
- Available in Solvent based and Solvent Free

Barrier coatings & adhesives for enhancing/protecting shelf life
Allowing for reduction of film layers and for mono-material structures

Collaborations in High Barrier Mono-material Flexible Packaging

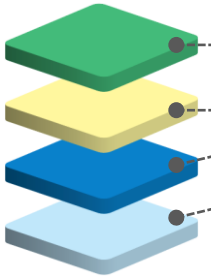


Ultra high Barrier PE Solutions*
Mono-Material Laminate



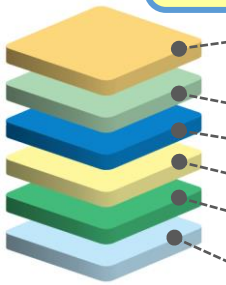
- Gravure Surface Printing: **SunSpectro Surface** (6 ECG inks) + **SunSys Vallotemp®** (heat resistant varnish)
- MDO-PE film (olefin)
- **SunBar® Aerobloc** Barrier Primer/Coating
- AlOx
- **SunBar® Paslim** Solvent-Free Barrier Adhesive
- PE sealant film (olefin)

High Barrier PE Solutions*
Mono-Material Mono-Layer



- **SunBeam®** (Electron Beam heat resistant varnish)
- **SunBeam®** (Eletron Beam inks)
- **SunBar® Aerobloc** Barrier Primer/Coating
- PE sealant film (olefin)

High Barrier PE Solutions*
Mono-Material Laminate

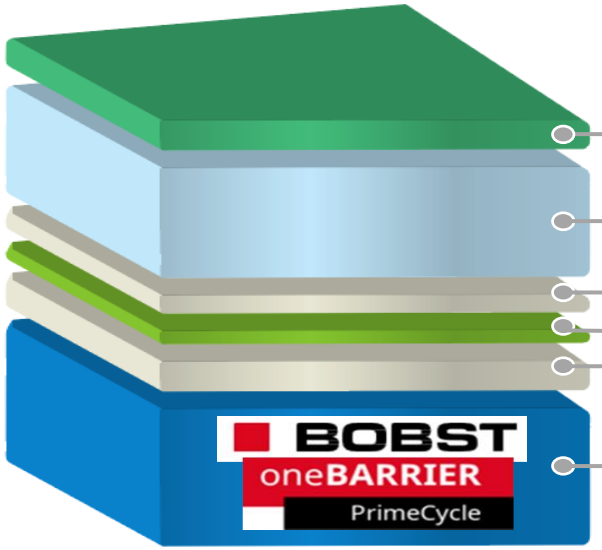


- **SunSys Vallotemp®** (heat resistant varnish)
- PE film (olefin)
- **SunBar® Aerobloc** Barrier Primer/Coating
- **SunStrato Duratort®** solvent-based PU inks
- **SunBar® Paslim** Solvent-Free Barrier Adhesive
- PE sealant film (olefin)

Modular barrier solution depending on the food package and target application

*CEFLEX D4ACE guideline:COMPATIBLE

Mono-Material Packaging – BOBST “oneBARRIER” Ultra High Barrier Transparent solution



Gravure Surface Printing (**Primer, 2K White, 6 ECG inks + heat resistant varnish**)

MDOPE

Barrier Primer/Coating
SunBAR®Aerobloc

AlOx

Solvent Free Barrier Adhesive
SunBAR®Paslim

PE sealant

Structure	OTR $cm^3/(m^2\ d)$	WVTR $g/(m^2\ d)$	Bond strength N/15 mm
MDOPE (25 µm)	4000 – 4200	4.5 – 7.5	
MDOPE/primer	11.57 ± 0.75	5.01 ± 0.33	
MDOPE/primer/AlOx	0.37 ± 0.01	2.17 ± 0.04	
MDOPE/primer/AlOx/ad/PE (75 µm)	**0.13 ± 0.01**	**0.48 ± 0.01**	**3.40 ± 0.32**

Packaging Solutions for Sustainable Mono-Material Flexible Packaging covering the full spectrum of performances up to Ultra High Barrier

Surface printing Proof of Concept for easier deinking

*CEFLEX D4ACE guideline:COMPATIBLE

Les composants qui perturbent le recyclage

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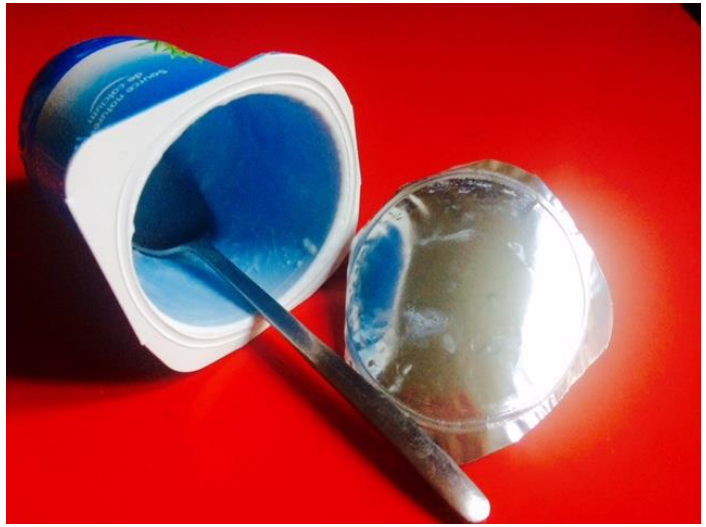
Suppression du Chlore dans les emballages

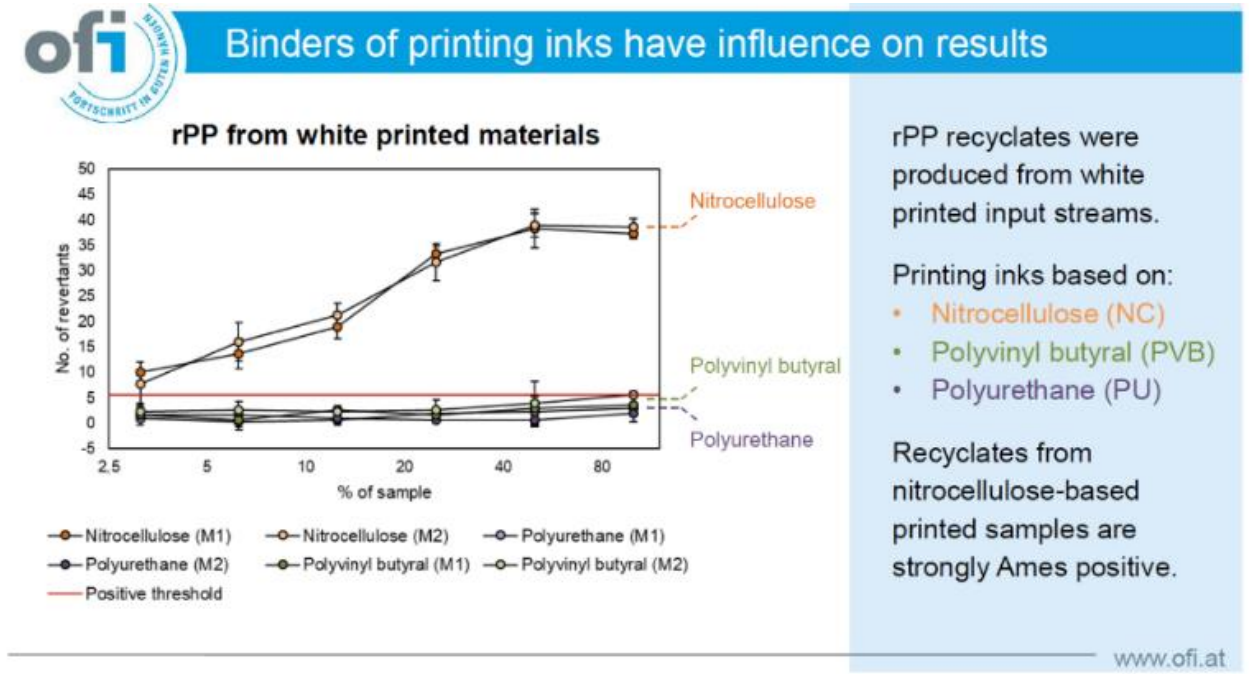
- Remplacement des series vinyliques (complexage, Sleeve) par des series PU
- Remplacement des vernis thermocollant standard par des formules sans chlore



Objectif : Suppression du Chlore dans l'emballage

Quel avenir pour la Nitrocellulose ?

- EU funded project “**PolyCycle**” has goal of developing a test strategy for the comprehensive safety assessment of plastic recyclates
- Preliminary results show that polyolefin films printed with **nitrocellulose** containing inks which is then recycled **becomes Ames positive (carcinogenic)**, whilst if alternative ink resins are used the recyclate is not Ames positive.
- *EuPIA will do internal testing to get an understanding of the issue*



La NC (Nitrocellulose), résine utilisée très largement dans les encres solvants pour emballage alimentaire apparait en mauvaise position selon les derniers tests de recyclage (confirmation EuPiA)

NIR

Near infrared spectroscopy (NIRS) is a spectroscopic technique that uses the near-infrared region of the electromagnetic spectrum to measure the absorbance and scattering of light by samples. This technique is used in a wide range of applications, from pharmaceuticals to food science.

NIR spectroscopy is used in two main ways in plastic recycling.

- Firstly, it can be used to **sort plastic** waste into different categories. This is achieved by identifying the absorption bands of different plastics and then using this information to separate them.
- Secondly, NIR spectroscopy can be used to **determine the purity** of recycled plastic. This is done by measuring the absorption of infrared radiation at different wavelengths and then comparing this to a standard.

- One of the main problems is that it can be difficult to get accurate results if the **plastic sample is small, transparent, thin or filled with carbon black**.

Des solutions industrielles existent désormais pour rendre l'utilisation NIR compatible avec vos designs

Le compostage

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Le compostage

- The EU draft Packaging & Packaging Waste Regulation (PPWR) will replace the current Packaging and Packaging Waste Directive. The importance of being a regulation is that is automatically law in all EU member states without any local interpretations.

- The PPWR is not favorable to coimpostable bioplastics, effectively only proposing their use in situation where packaging is heavily contaminated with food (Tea Bags / Coffee Capsule Leading)

- The criticism of compostable packaging is the geographic availability of suitable waste streams (apply to both Industrial and Home Composting)

A la mode il y a 10 ans avec l'essort des bio-plastiques, le compostage redevient une source de recyclage pour les emballages souillés par les aliments (thé,café) qui ne peuvent etre recyclés dans le circuit standard

Conclusion

Il existe aujourd'hui techniquement des solutions pour :

- Diminuer le poids des emballages
- Utiliser plus de papier
- Désencrer les films pour mieux les réutiliser
- Recycler les packaging souillés ou permettrent à ceux qui ce retrouvent dans la nature de ne pas l'impacter négativement (fragment de plastiques)

Les facteurs limitants sont :

- La collecte des emballages souples
- L'unification Européenne à ce sujet
- Limites du désencrage
- Toxicité de certaines substances lors du process de ré-extrusion
- Les contraintes législatives de plus en plus fortes sur l'alimentarité (Loi Agec)

Questions