

2024 FlexPack PLACE Conference

April 14-17, 2024 • San Diego, CA • Wyndham San Diego Bayside



High Barrier Mono-material Polyethylene Structures using Coating

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Matt Ahearn (speaker), Guido Kollbach -- ***Henkel***

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Mono-Material Solutions

PE Sealant Web:

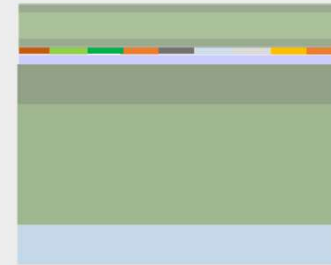


- PE
- PE
- Sealant PE

OPET or OPP → Printed OPET or OPP

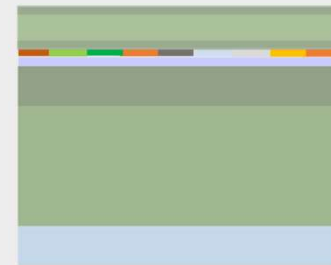


PE sealant film laminated to PE print layer



Ex. frozen food

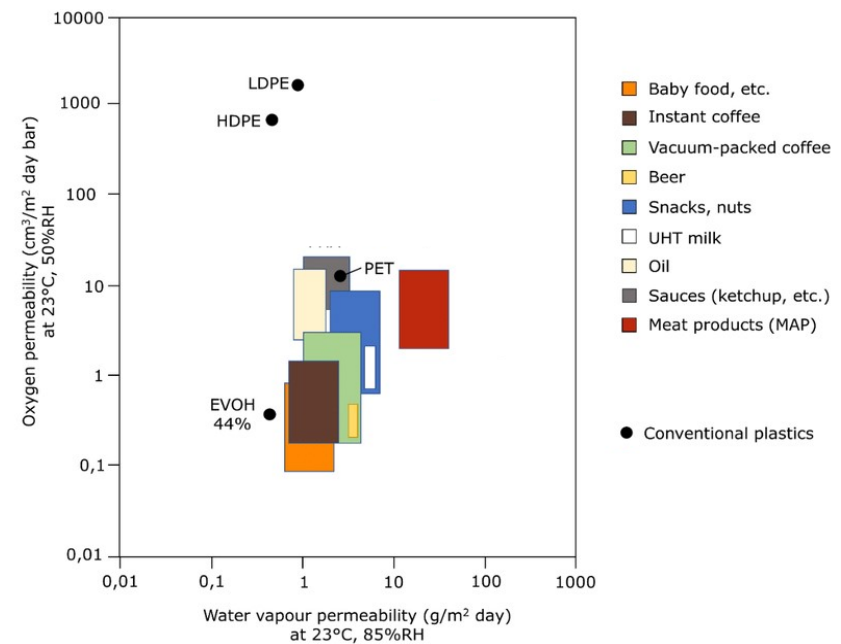
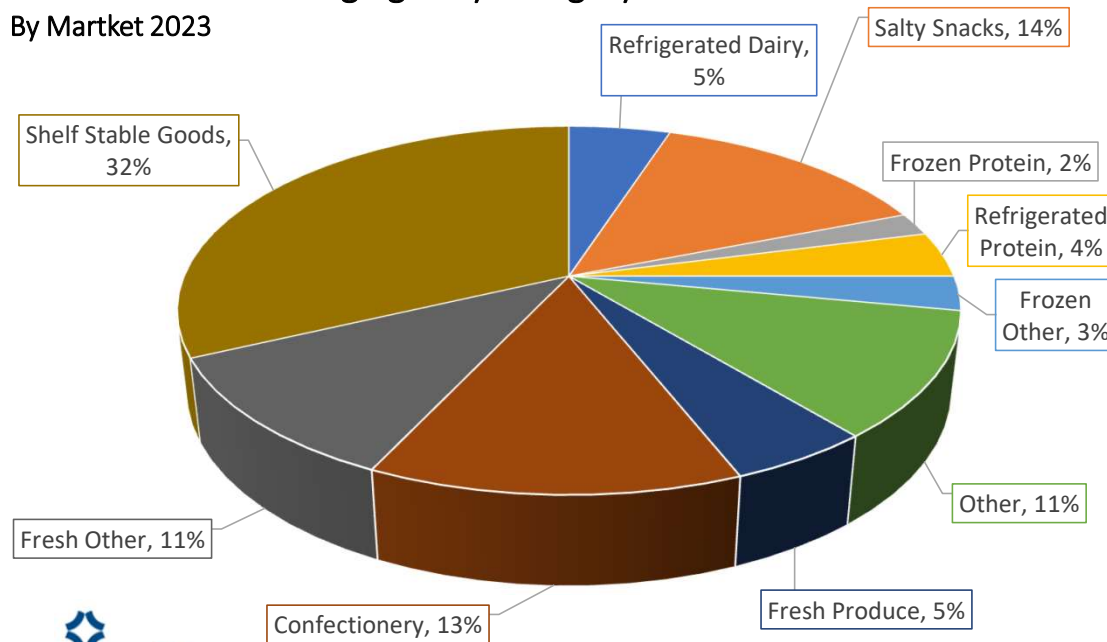
PE sealant film laminated to PE print layer Containing 30-40% recycled content





How to get High Barrier in Mono-Material Structures?

Food – Flexible Packaging % by Category
By Market 2023

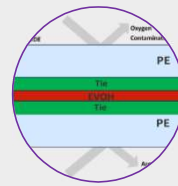
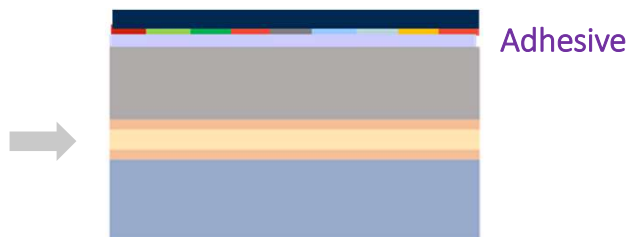
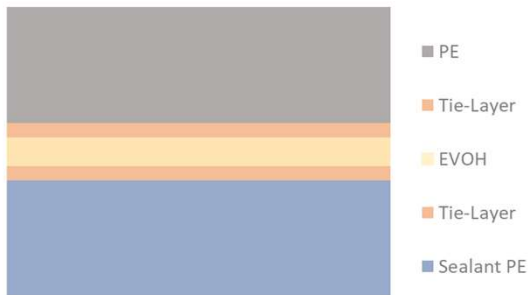


From Figure 5 in: Murat Yanat, Karin Schroën, 2021. Preparation methods and applications of chitosan nanoparticles; with an outlook toward reinforcement of biodegradable packaging, *Reactive and Functional Polymers*, 161.
<https://www.sciencedirect.com/science/article/pii/S1381514821000419>

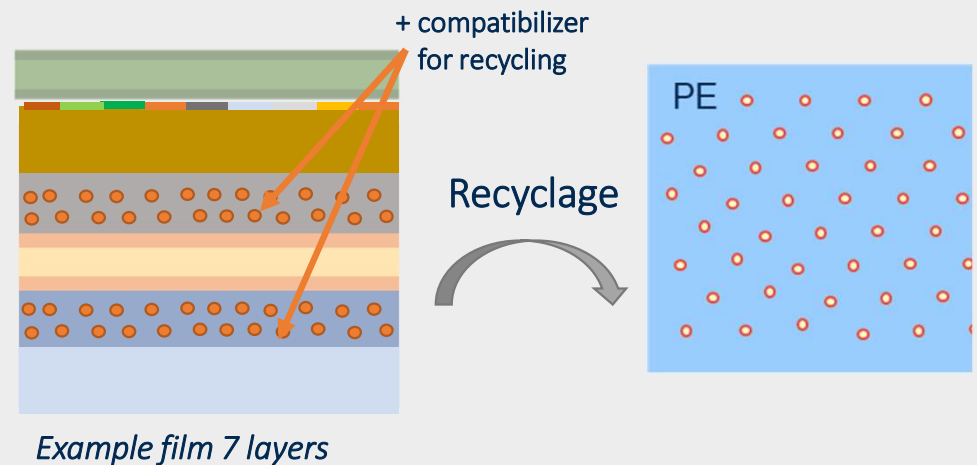


Recyclable High Barrier Solutions

Sealant Film PE/EVOH (min. 5 layers)



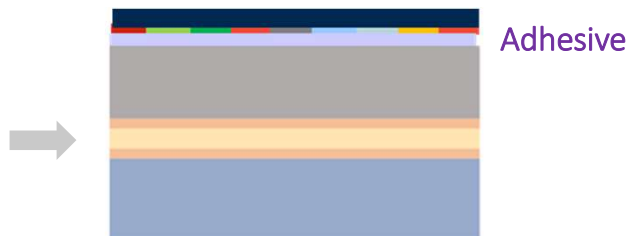
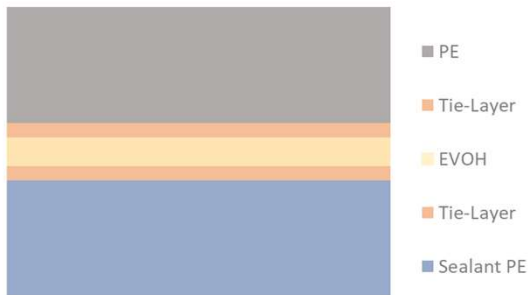
PE/EVOH/Compatibilizer sealant film
laminated to a PE print layer





Recyclable High Barrier Solutions

Sealant Film PE/EVOH (min. 5 layers)



Example film 7 layers

Axipolymer
Innovation Partner of Polymer Industry



PE/ 'GL' sealant film laminated to a PE print layer

'GL': A recyclable barrier resin developed in Montreal

2020: Nationwide winner food packaging plastics challenge



Environment and
Climate Change Canada
Environnement et
Changement climatique Canada

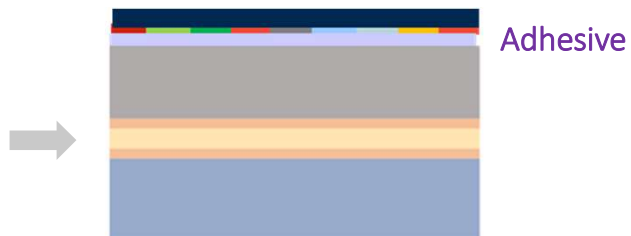
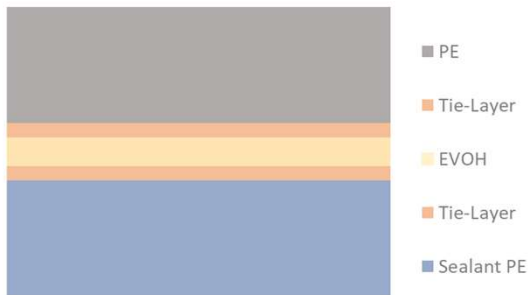
APR Certified up to 30% GL in the PE





Recyclable High Barrier Solutions

Sealant Film PE/EVOH (min. 5 layers)



Collaboration with Henkel

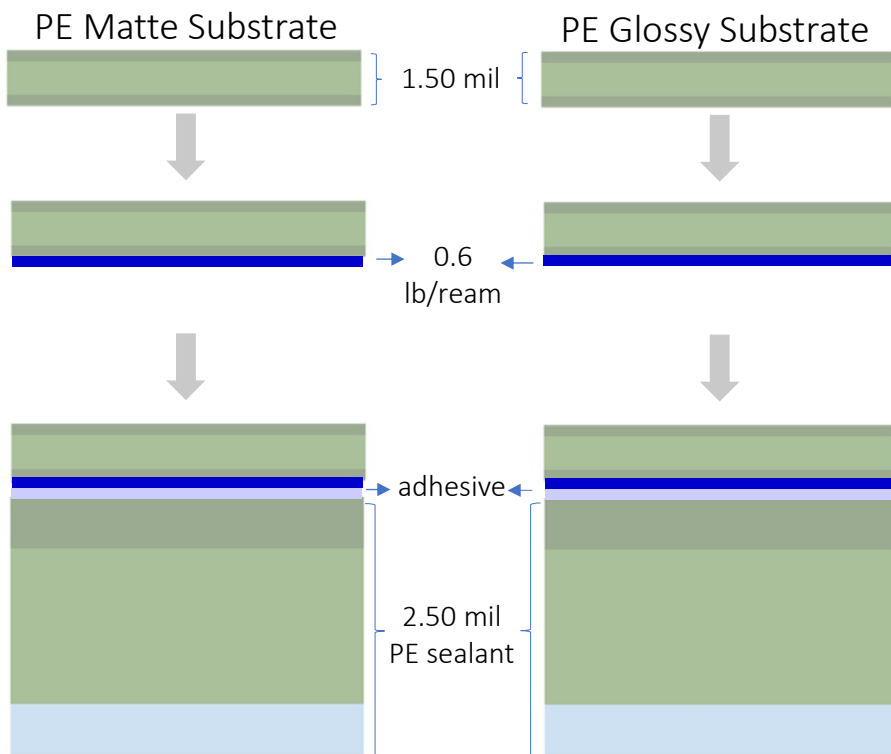
PE sealant film laminated to PE print layer



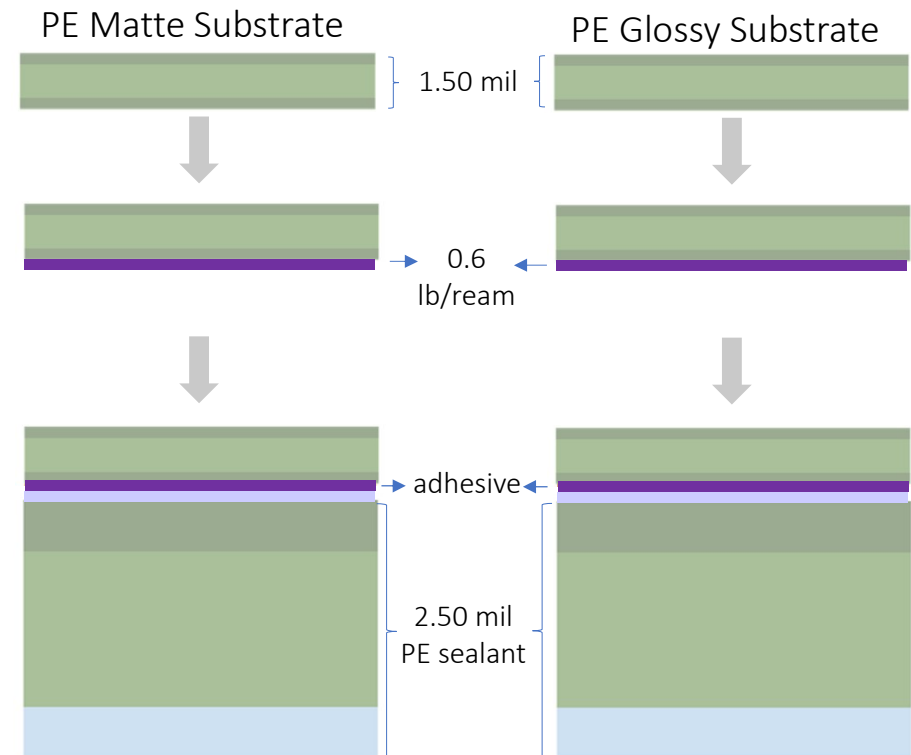


Experimental Analysis

Barrier Coating A

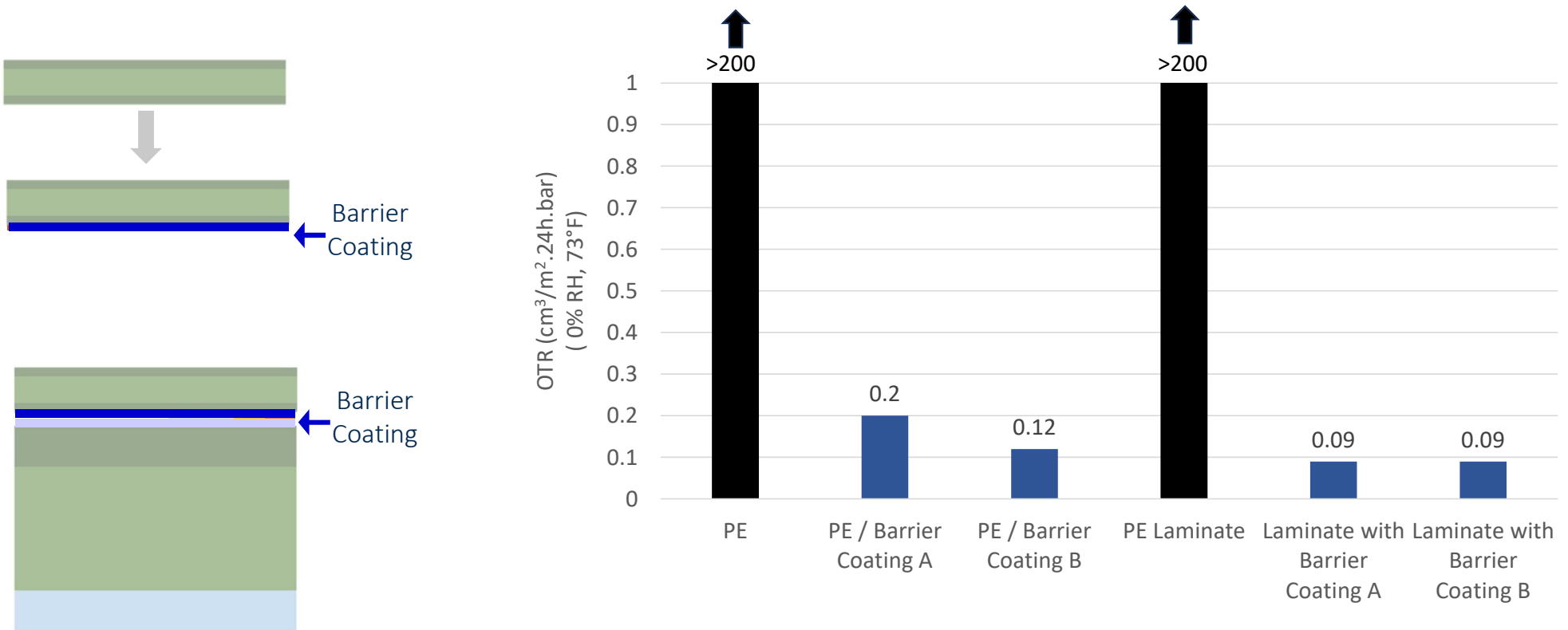


Barrier Coating B



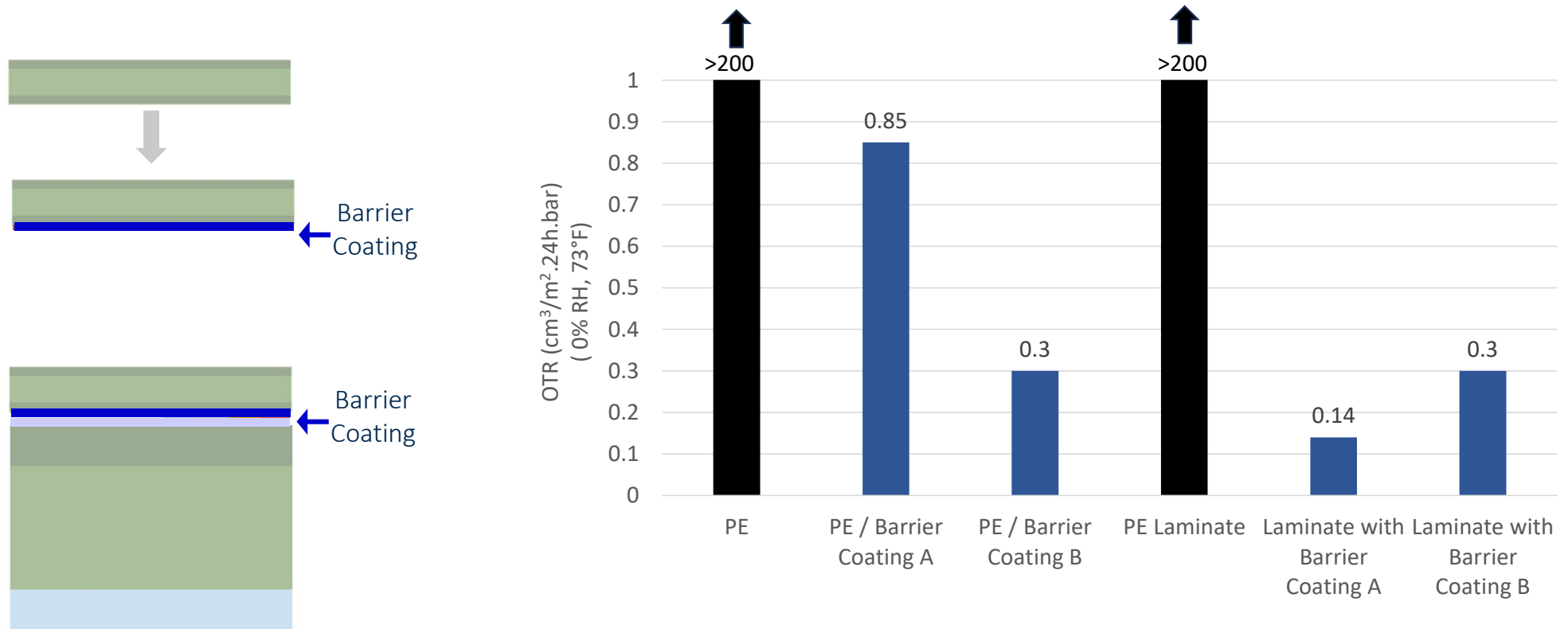


Oxygen Barrier Results: Matte Print Layer





Oxygen Barrier Results: Glossy Print Layer





Optical Properties



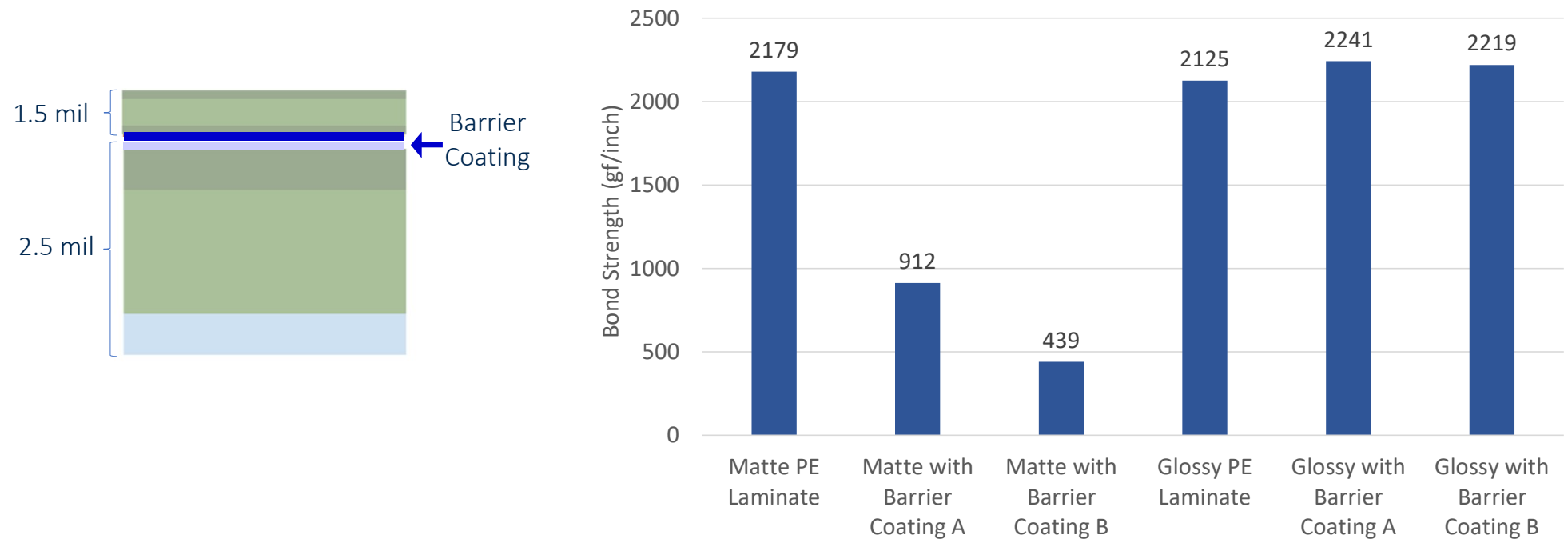
Sample (Film Thickness 1.5 mil)	Transmittance (%)	Haze (%)	Clarity (%)
PE (Matte Print Layer)	92.9	83.1	8.6
PE + Barrier Coating A	92.1	73.2	11.4
PE + Barrier Coating B	92.0	72.4	12.4



Sample (Film Thickness 1.5 mil)	Transmittance (%)	Haze (%)	Clarity (%)
PE (Glossy Print Layer)	93.7	11.0	82.6
PE + Barrier Coating A	93.3	9.2	82.1
PE + Barrier Coating B	92.9	8.9	81.8

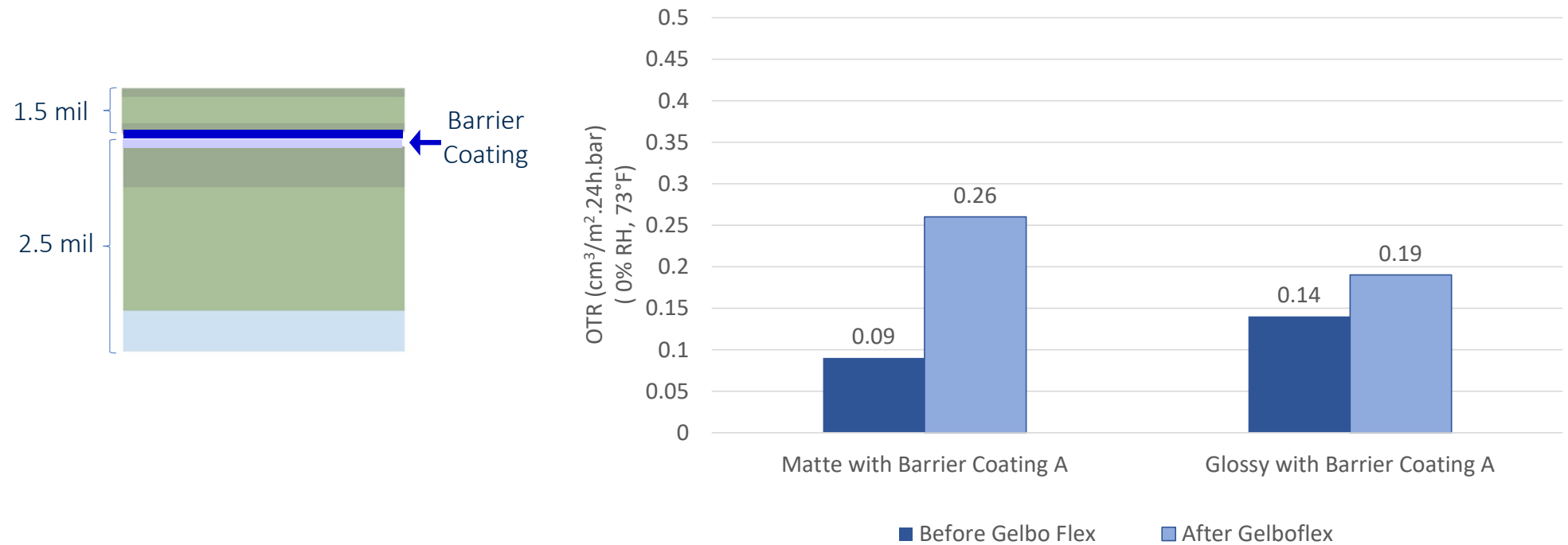


Bond Strength





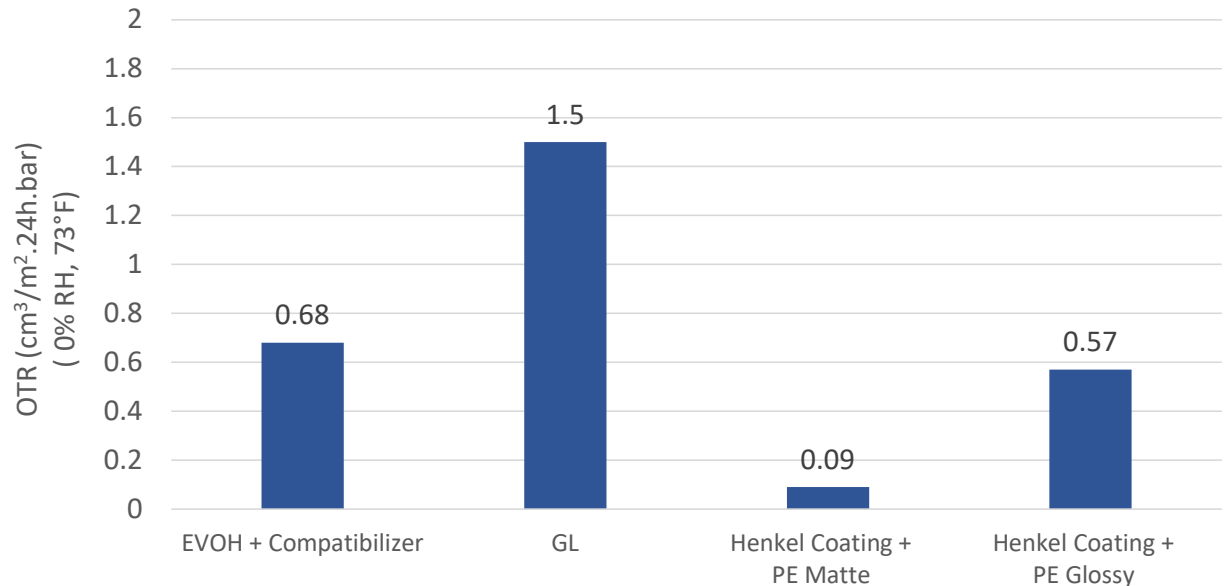
Gelbo Flex Testing (20 cycles)





OTR Comparison on Current Recyclable Barrier Solutions

Sample		Thickness (mil)	
EVOH + Compatibilizer	PEX Print Layer	1.25	4.75
	PEX Barrier Sealant	3.50	
GL	PEX Print Layer	1.25	4.75
	PEX Barrier Sealant	3.50	
Henkel Coating + PEX Matte Substrate	PEX Matte Print Layer	1.50	4.00
	PEX Sealant	2.50	
Henkel Coating + PEX Glossy Substrate	PEX Glossy Print Layer	1.50	4.00
	PEX Sealant	2.50	





Incorporating PCR

PE sealant film laminated to a PE print layer





Conclusion

In the recent years, there has been an increasing emergence of new technologies to achieve recyclable high barriers structures.

We recognize that every technology exhibits unique advantages and disadvantages, tailored to specific applications and markets.

The barrier coating technology developed by Henkel allows structures to be transformed from non-barrier to barrier.

The non-oriented PE print layers that were used in this study, provide very promising barrier results that are comparable with MDO-PE print substrates.

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Acknowledgments and Team Collaboration

Vincent Rohart
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Thank You!



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