



# Moisture and Oil Retention in Coated Papers for Flexible Food Packaging: A Study on Barrier Properties and Surface Characteristics

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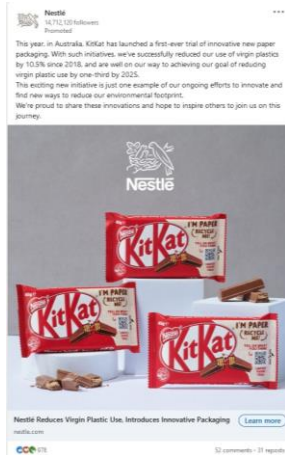
\*\*SIRRIS – Department Circular Economy (Belgium)

The results were obtained during the VLAIO-TETRA-CORNET project REPAC<sup>2</sup> (HBC.2021.0288), titled 'Functional and Recyclable Coated Papers for Food Packaging'

# Introduction and objective

## ■ Introduction:

- Paper fibre: renewable resource + mechanical recyclable
- Food industry: Transition to coated paper is considered in primary flexible food applications



### A closer look at Ritter Sport's "Mini Mix" paper pouch packaging

5 MAY 2021



Alfred Ritter GmbH & Co. KG recently switched its Ritter Sport "Mini Mix" packaging from trays wrapped in plastic film to a stand-up pouch made of paper.

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NEWS | SUSTAINABILITY

### Mars Wrigley to Switch to Paper-Based Packaging in Australia

Popular candy bars Snickers, Milky Way, and Mars Bar will be packaged in a paper film with ultra-thin plastic layer, making the flow-wrapped packs curbside recyclable in what the company says is a world first.

By — [Lindy Hughson](#)

Dec 21, 2022

- Uncoated paper: low/no barrier, not heat sealable → Coating is required
- REPAC<sup>2</sup>-project: screening of 15 commercially available coating/coated papers

## ■ Objective: study the relationship between barrier properties and physical surface properties

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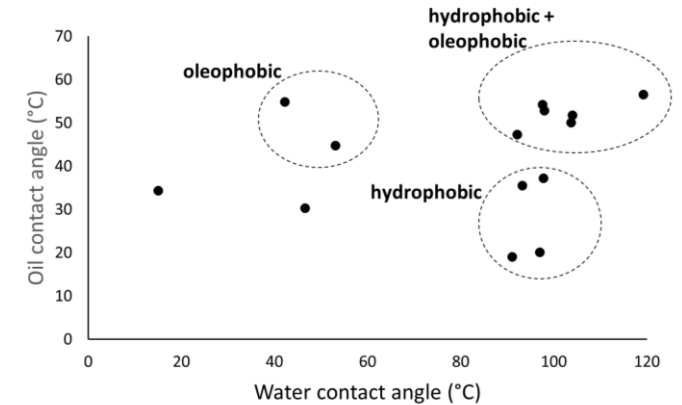
# Materials & methods

## ■ Materials

- Dispersion – extrusion – wax coatings → coated papers of 40 – 100 g/m<sup>2</sup>
- Cellulose nanocrystals, polyvinylalcohol, acrylic acid copolymers, polyethylene, ...

## ■ Methods

- Surface characterization
  - Contact angles with water and sunflower oil
  - Roughness: Bendtsen (ISO 8791:2) + visual assessment (ISO 25178)
  - Main component seal surface is identified with attenuated total reflectance Fourier transform infrared spectroscopy (ATR-FTIR)
- Barrier characterization
  - Liquid absorptions (water + sunflower oil) with Cobb<sub>1800s</sub> test (ISO 535)
  - Water vapor permeability while outer side is exposed to 85% RH – 23 °C (ASTM F1249)
- Statistical correlations: Spearman coefficients and p-values of the variables



Relation water - oil contact angles



Rycolab Cobb tester

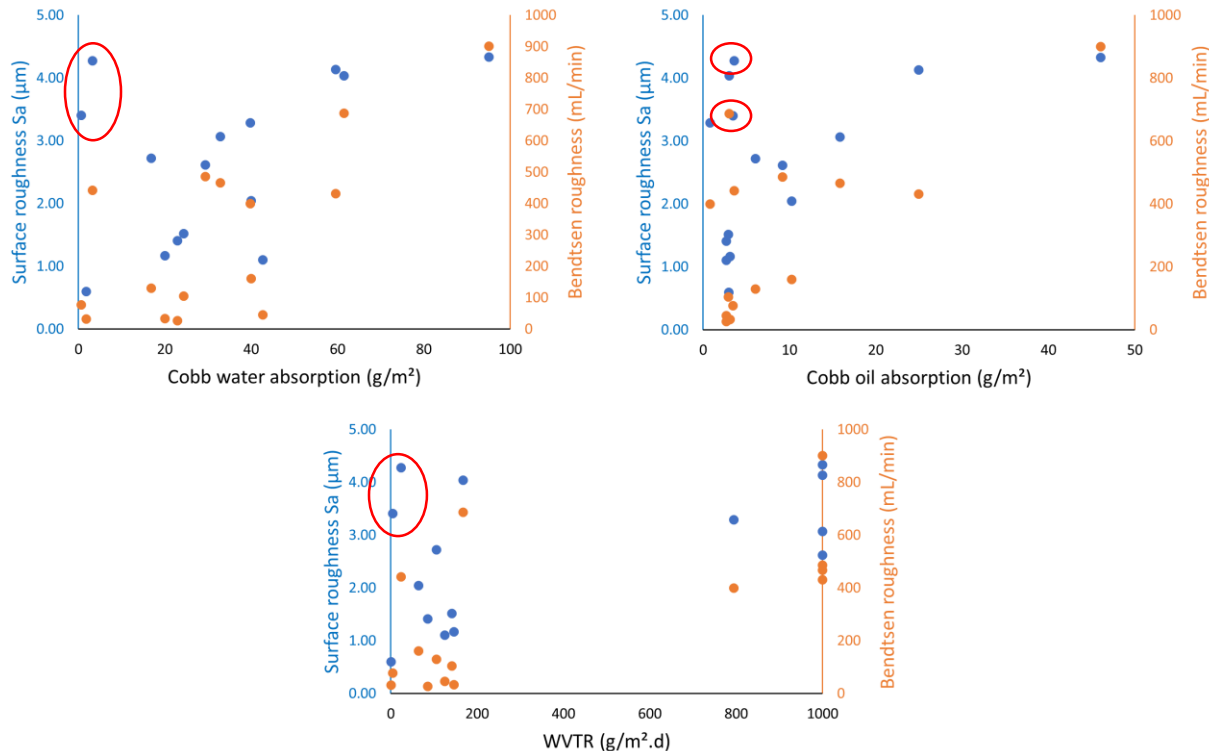


Mocon Perma-tran

# Results

## ■ Correlations

- Not between contact angles and barrier properties
- Several correlations between roughness and barrier properties



- Asymptotic relations, with high absorption or permeability levels at high roughness values
- Outliers, characterized by high roughness and low absorption and permeability = 2 extrusion coated papers

XY-scatterplots of roughness (Sa, Bendtsen) and barrier (Cobb water + oil absorptions, WVTR) variables

# Conclusion

- Overview of variations in surface characteristics and barrier properties among coated papers available in the market for primary food applications
- Smooth surface coating is important to achieve good barrier performance
  - Other factors
    - Coating process: e.g. extrusion coated papers (outliers)
    - Material properties: e.g. moisture barrier of polyethylene
    - Nature and porosity of underlying paper

Thank you for your attention!



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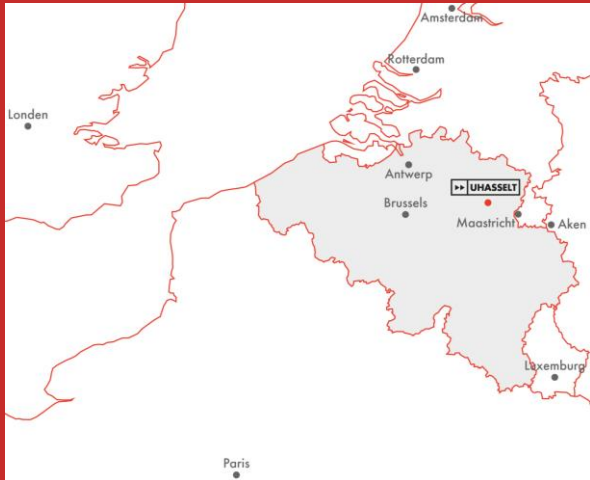
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