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Innovative solutions for sustainable paper packaging

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BASF India Limited

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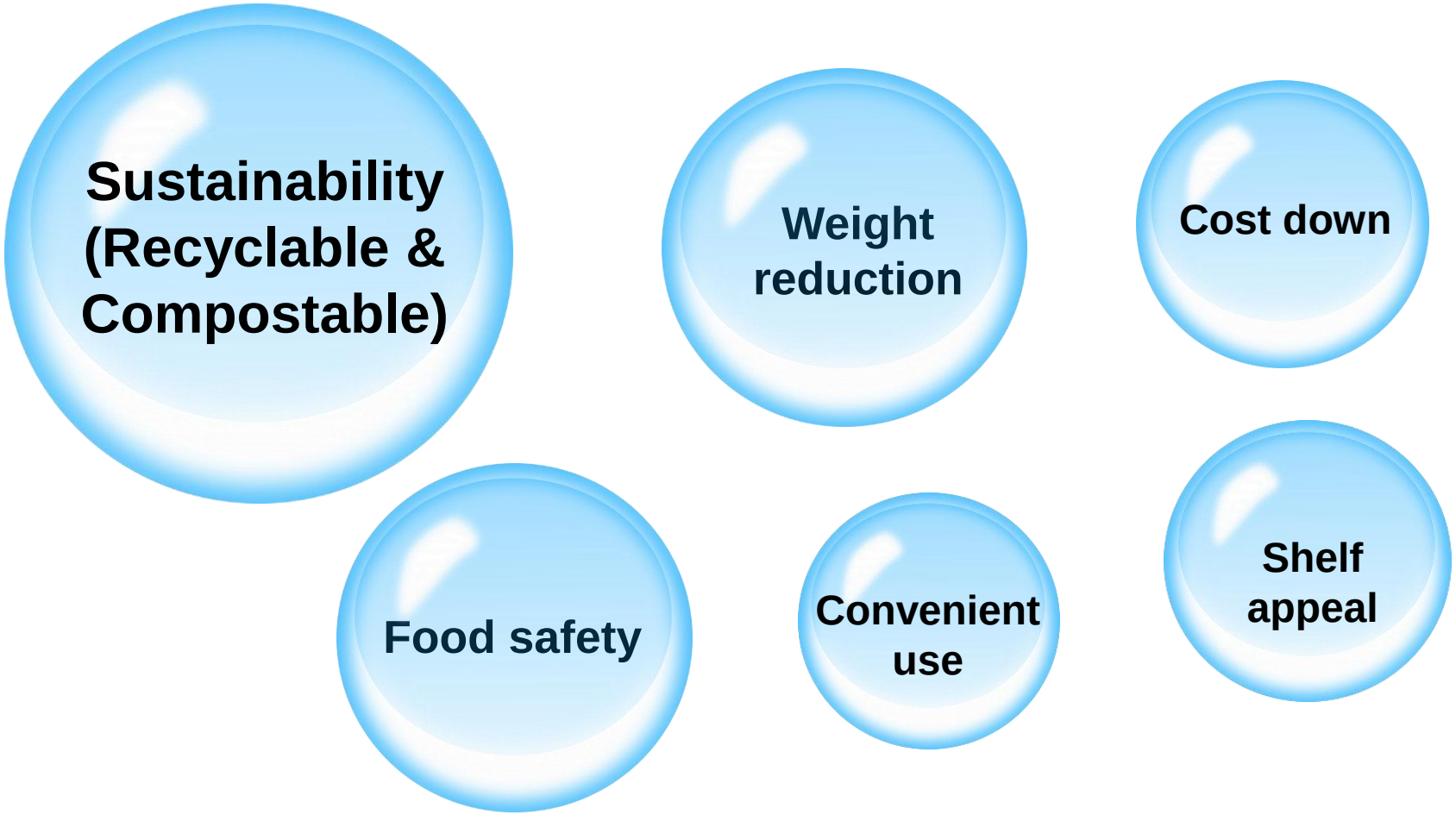
- Packaging – Introduction
- Purpose of Packaging
- Challenges
- Chemistry at help
- Actual case studies

Mega trends of packaging market



Source: Smithers Pira Study in European packaging

Eco-friendly news from packaging market

- Global **green packaging market growth** at above GDP rate (CAGR 6.2%) (source: TMR)
- China is sorting its household waste problem and trash will be classified into three types (**recyclable**, hazardous and perishable) (source: PBIA)
- Chinese green action plan to increase **recycling output** by 67% (source: PBIA)
- Singapore requires **mandatory packaging sustainability reporting** by 2021 (source: PBIA)

"Growing demand of Recycling"

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Purpose of Packaging

- For barrier
- For information transmission (medicine boxes)
- For Market Communication
- For convenience of handling, transporting and distribution
- For Security (tampering proof)
- For physical protection of enclosed material (mechanical shock, vibrations etc)

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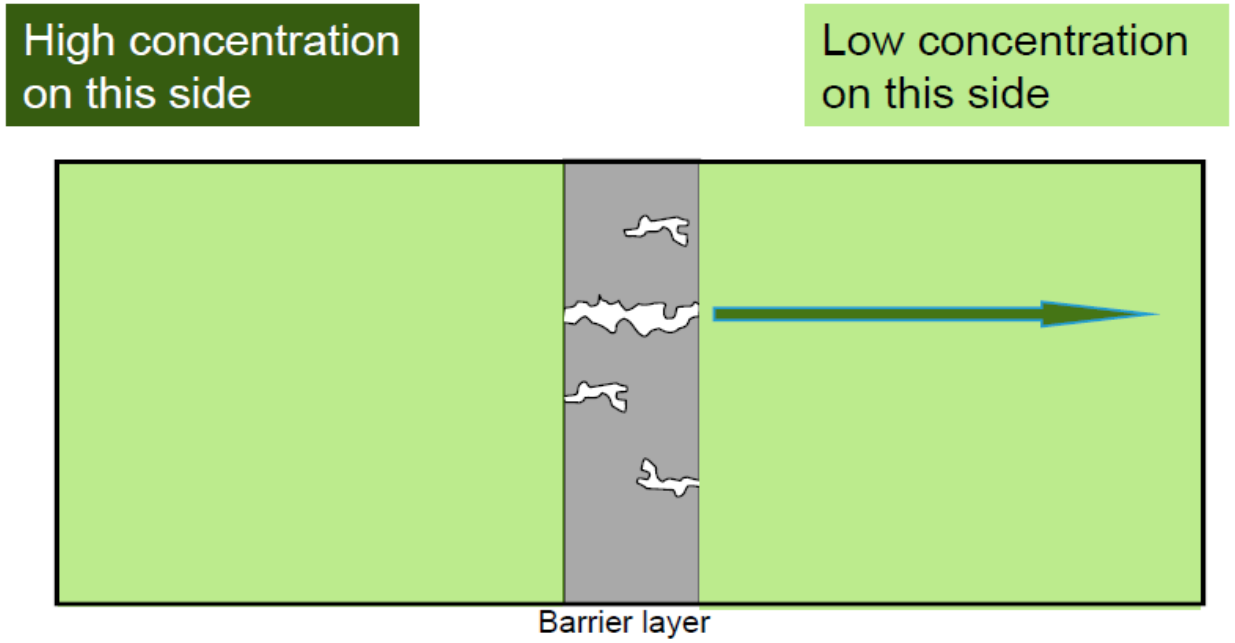
Principle of Barrier - Diffusion thru defects

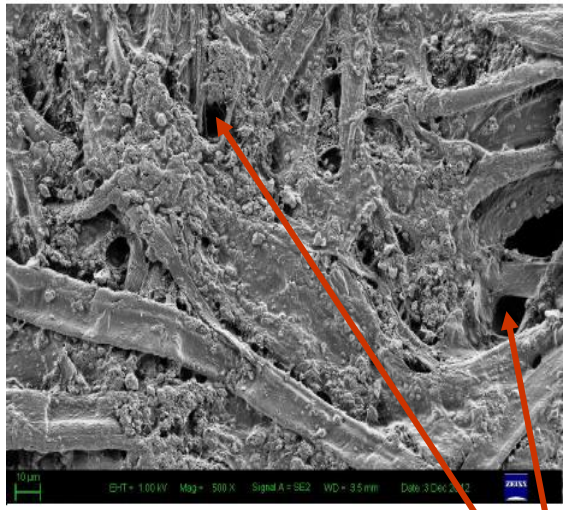


Permeation occures through pores and defects in a layer
→ Barrier layers must be defect- and pore- free

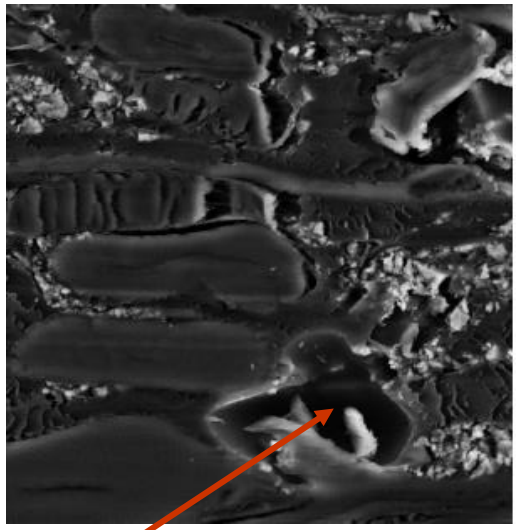
PAPER → A CHALLENGING SUBSTRATE FOR BARRIER COATING DUE TO ITS ROUGHNESS AND POROSITY

Structure of uncoated sheet under SEM

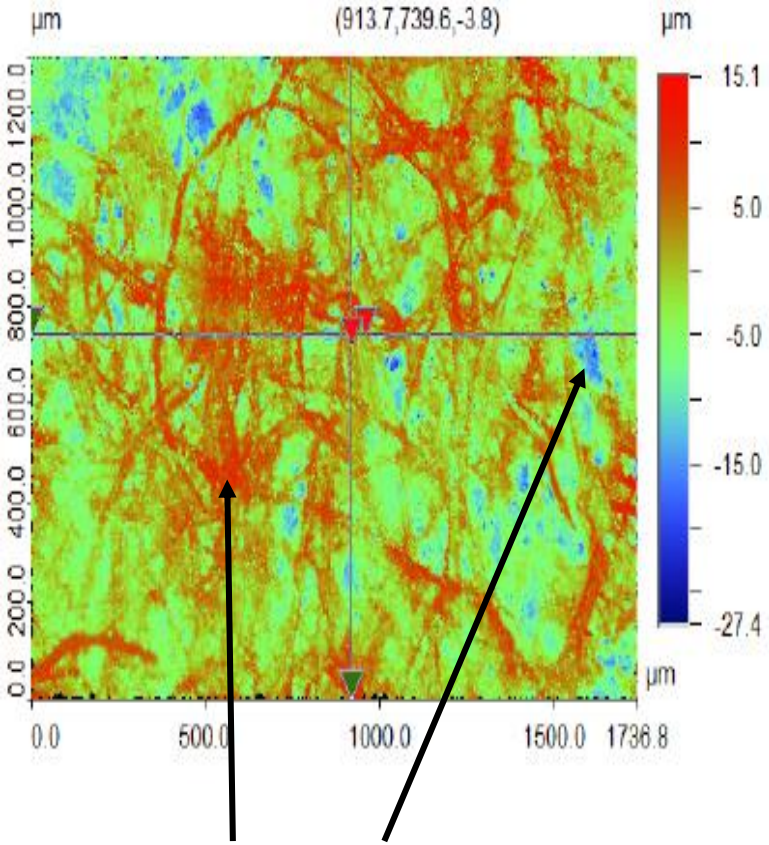
Surface



Cross Section (MD)



Capillaries



Hills & Valleys

Porosity and Roughness is a challenge to develop BARRIER

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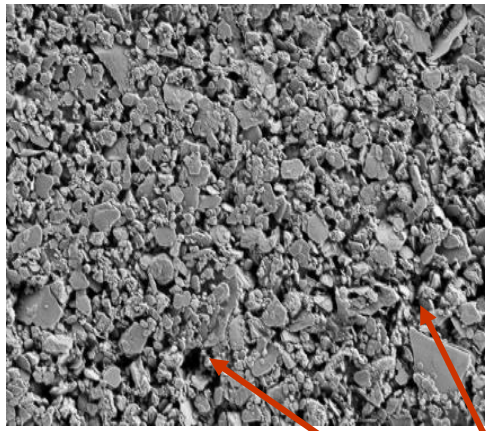
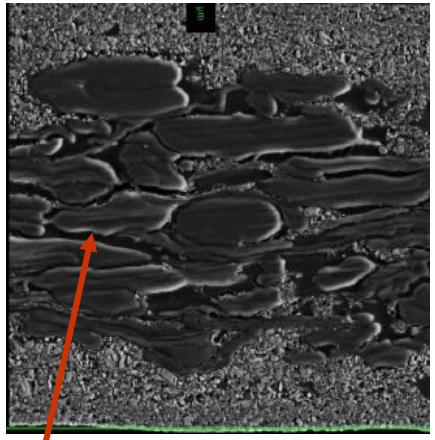
Structure of coated/calendered sheet under SEM

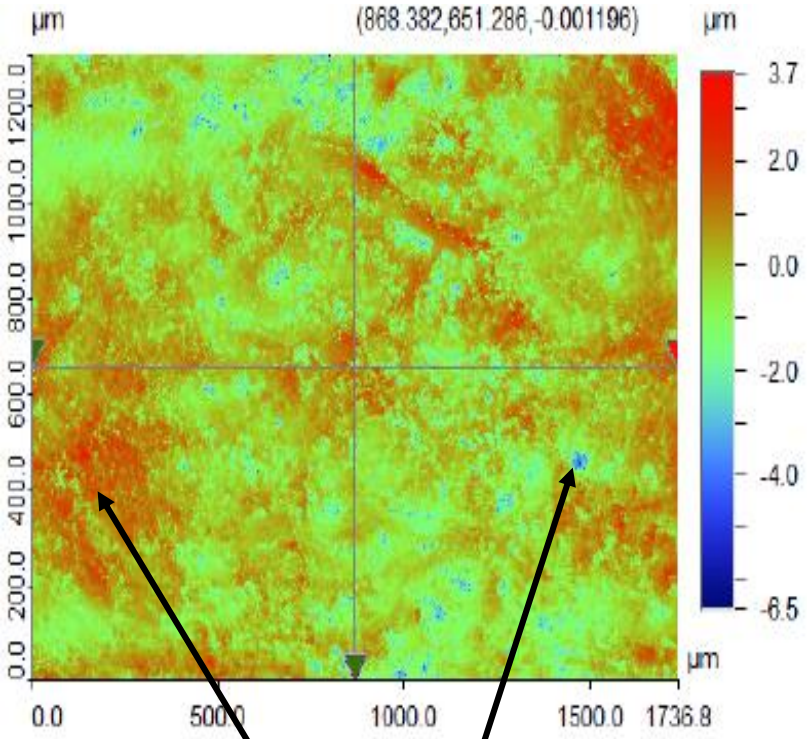
Surface



Cross Section (MD)



Capillaries



Hills & Valleys

Porosity and Roughness is a challenge to develop BARRIER

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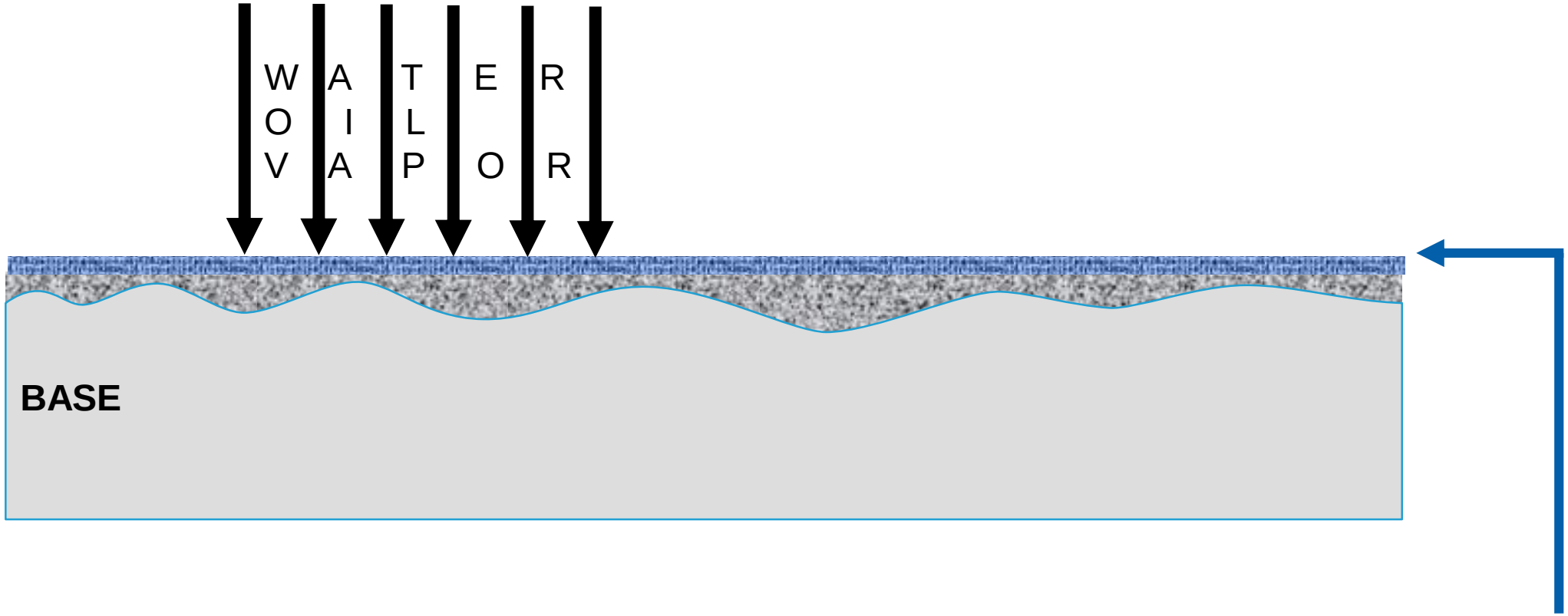
Principle of Barrier - Barrier coating on Paper



If base is corrected for porosity and roughness, a thin layer of barrier coat is sufficient

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Barrier definition in packaging industry

Specific material that is designed to stop or reduce the passage of (…….) through a package

- Oil & Grease
- Water & Liquid
- Moisture & Vapor
- Mineral oil – Recycle Paper

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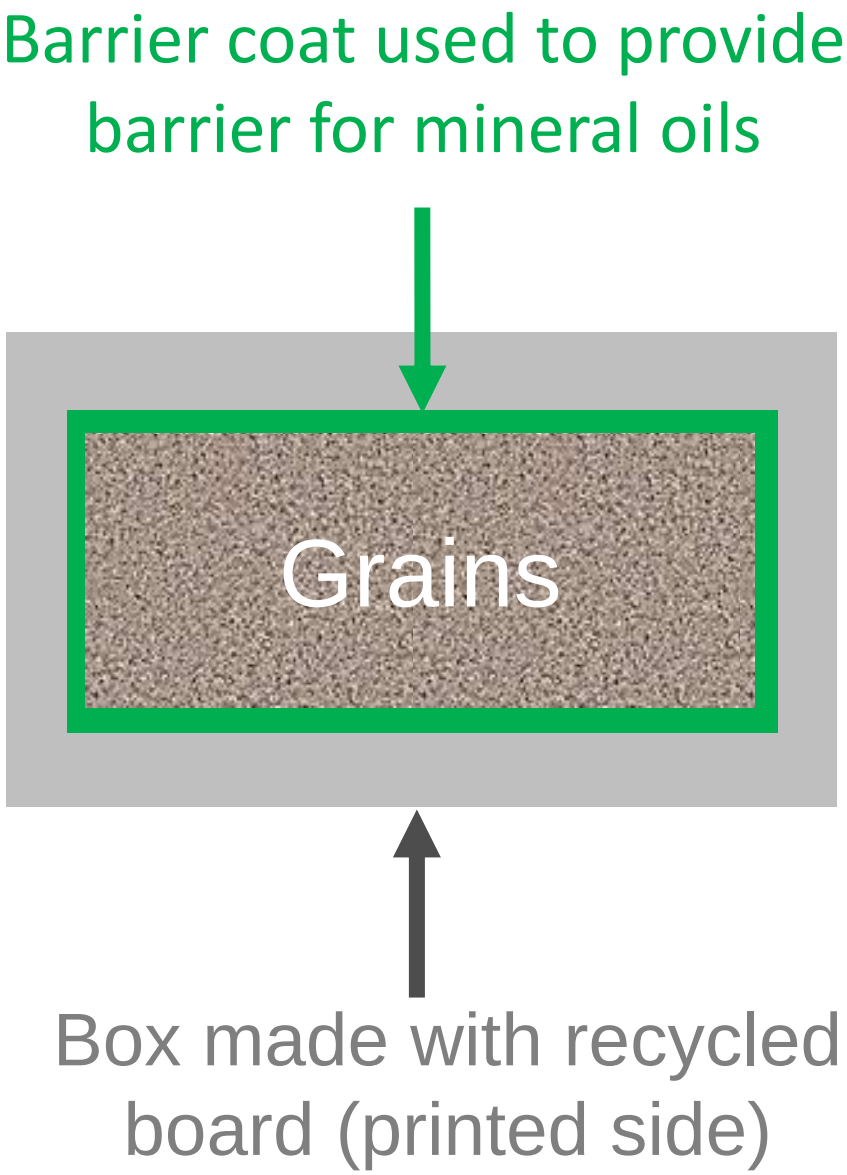
Mineral oil barrier (MOB)

- ✓ Barrier against contaminants like:
  - ➢ MOSH (Mineral oil of saturated hydrocarbons)
  - ➢ MOAH (Mineral oil of aromatic hydrocarbons)
- ✓ Source of contaminants – Printing ink coming along with recycled furnish (eg. Printed news print)

Mineral oil barrier (MOB)

- Dry Food items are directly packed in the box made with recycled packaging board
- Stored for long time
- In few countries, there are limits specified for the contamination of the food.
- It is possible to simulate the mineral oil migration at lab scale



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Mineral oil barrier (MOB)

- **<u>With a Barrier Coat, recycled board can be made suitable for packaging food directly in the box (without secondary packaging).</u>**
- There is potential to replace virgin packaging board in certain applications. Below are some of the other challenges in achieving so:
  - ✓ Printability
  - ✓ Stiffness
  - ✓ Odor

But its POSSIBLE & HAPPENING at few places

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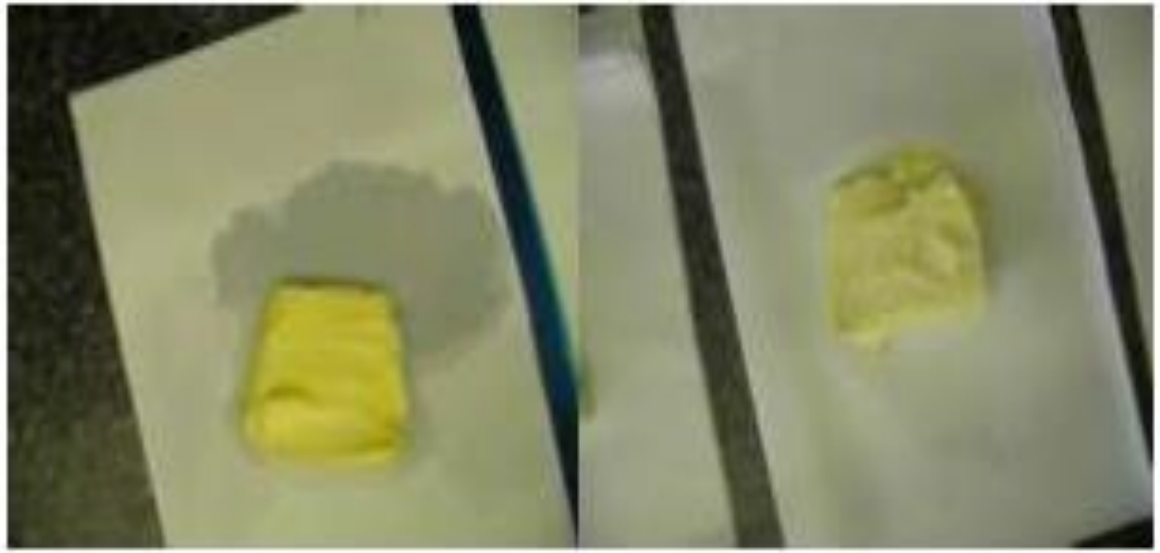
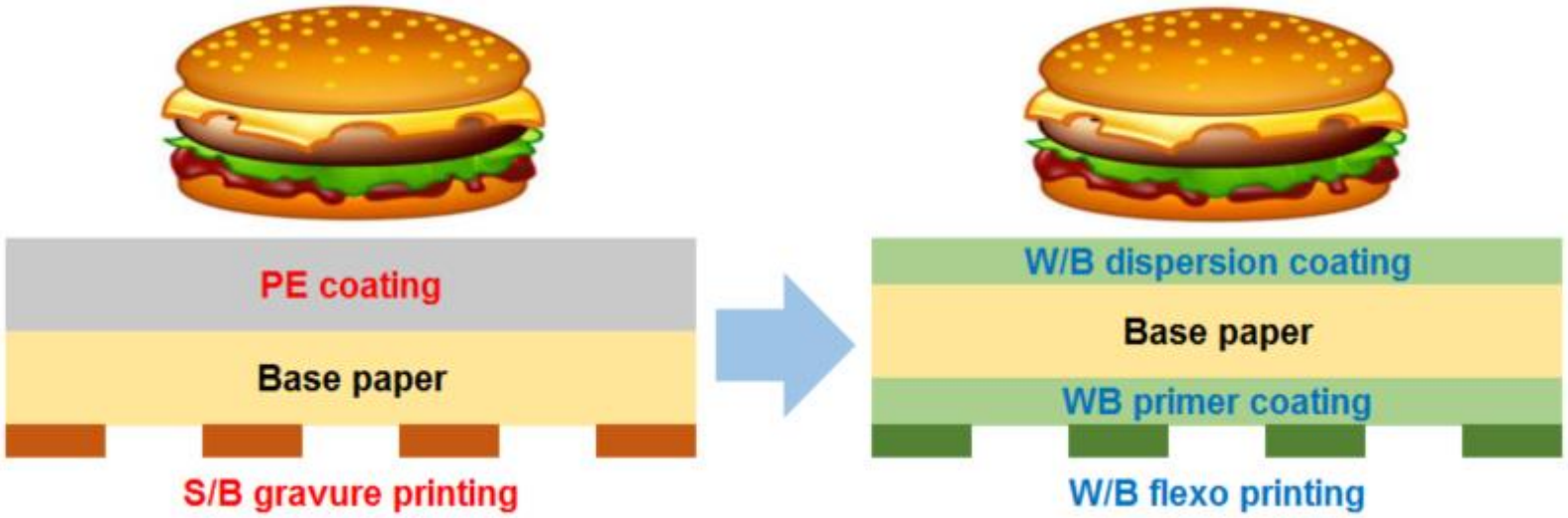
Oil and Grease Resistance (OGR)

- Short term resistance against absorption of oil
- Example – burger wrapper, plates, clamp shells, popcorn buckets etc



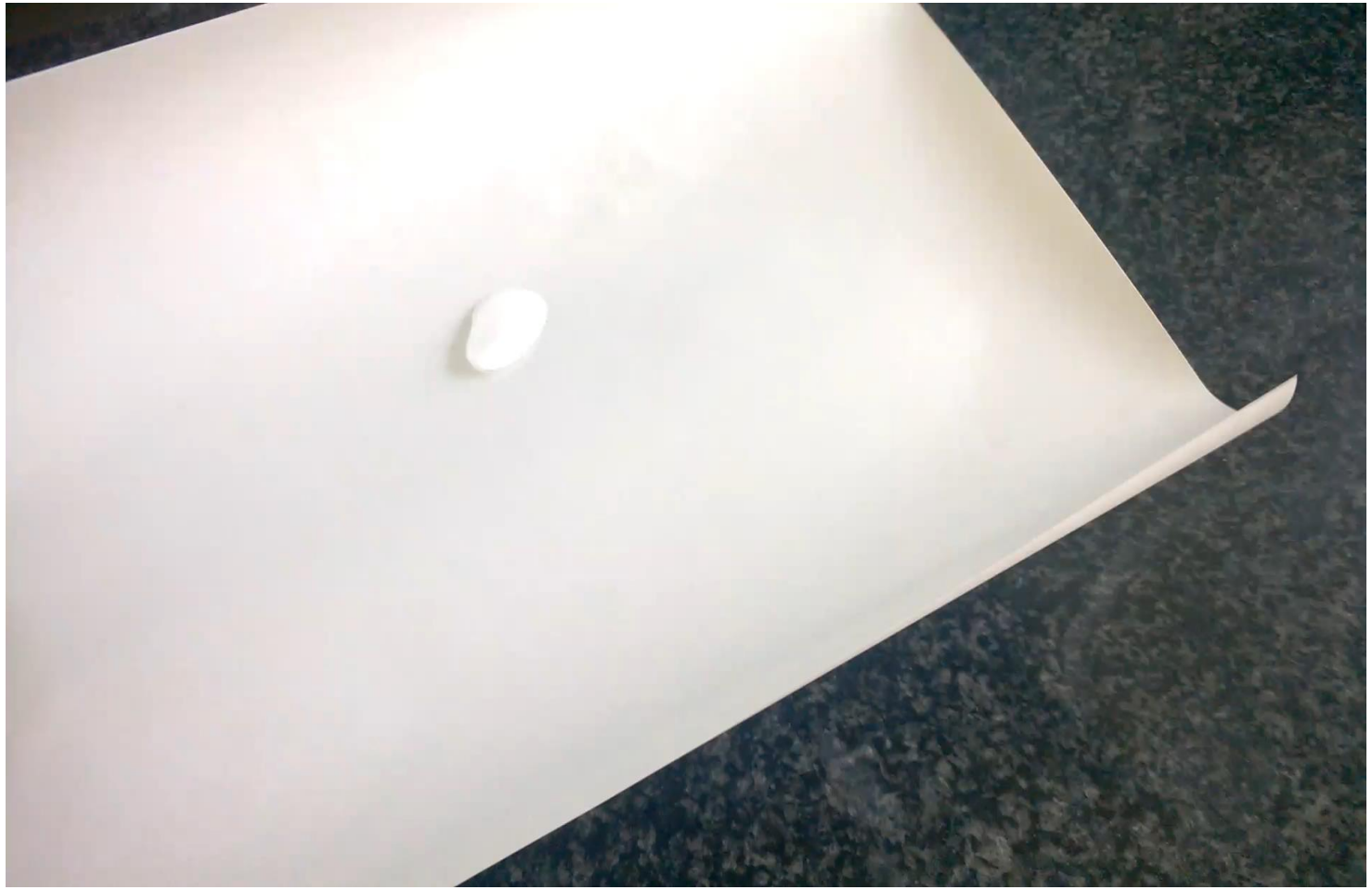
Oil and Grease Resistance (OGR)



Benefits	PE coated wrapper	Dispersion coated wrapper
Cost saving	10 gsm of PE coating	3-4 gsm of Epotal coating
Recyclability	Difficult to recycle, Not compostable	Easy to recycle, More compostable than PE
Tasty burger	Soggy bun by poor permeability	Not soggy bun by good permeability
Eco-friendly ink	Solvent based gravure ink	Water based flexo ink

Water Repellency

- Barrier for Moisture
- Paper Cups
- Food trays
- Frozen food packaging



Paper Cups

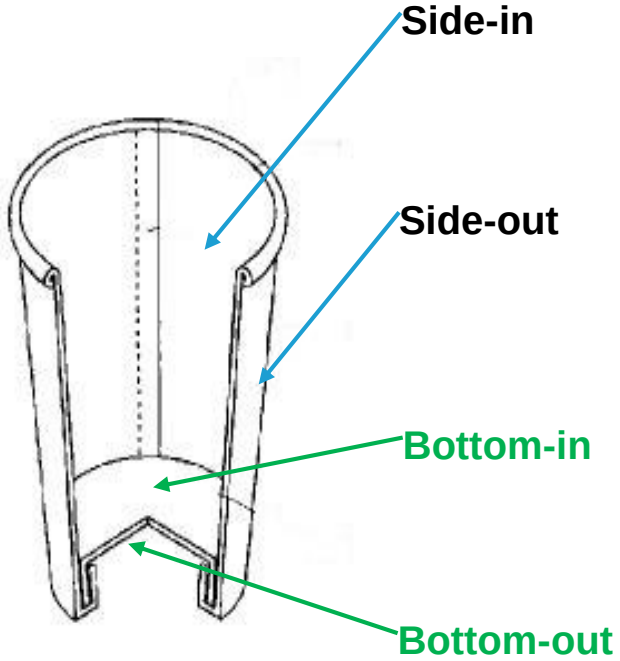
Cold cup

- **Structural characteristic**
  - Condensation occur easily on out of the side wall
  - Need to coat Side-out too
- **Coatings**
  - Side-in & Bottom-in: Double coating
  - Side-out & Bottom-out: Single coating

Hot cup

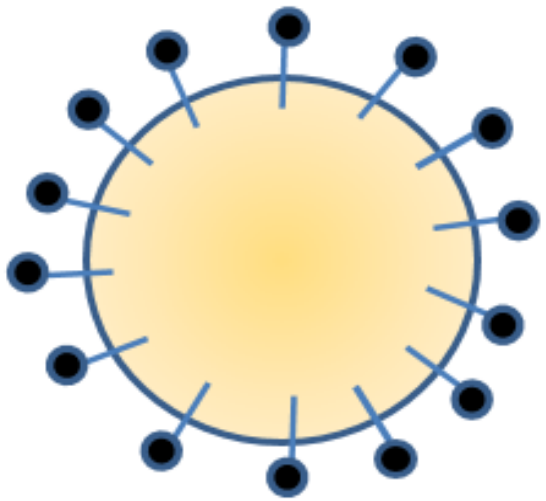
- **Structural characteristic**
  - No need to coat for Side-out
- **Coatings**
  - Side-in & Bottom-in: Double coating
  - Bottom-out: Single coating

Coating side

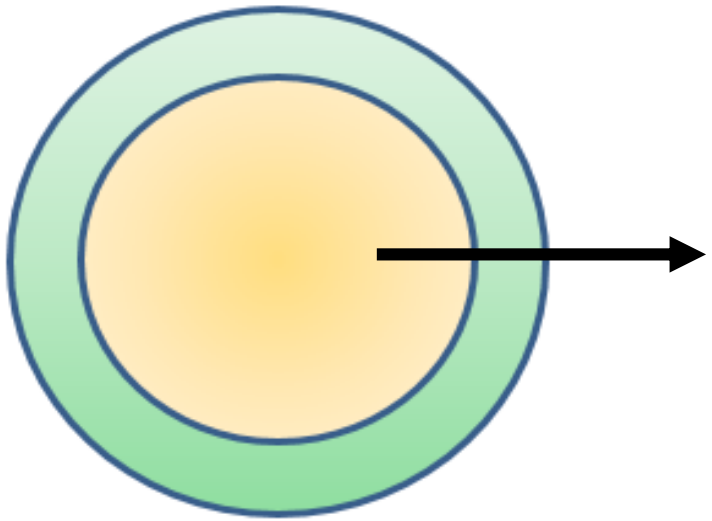


Apart from water repellency, needs high level of heat sealing

Innovative solutions at BASF - Core Shell water based Acrylic Dispersions



Conventional type

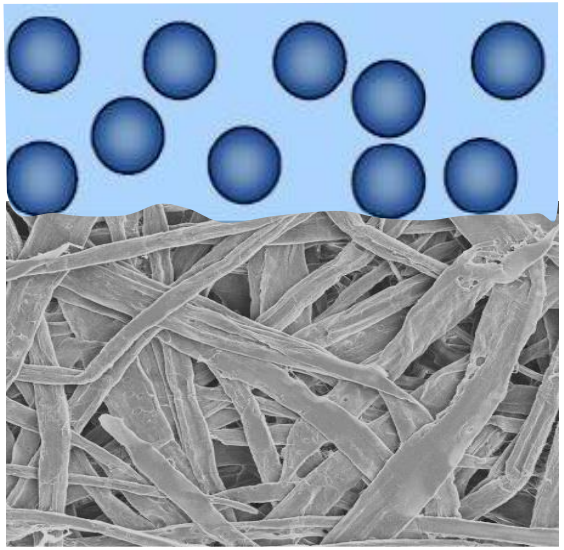


Core-shell type

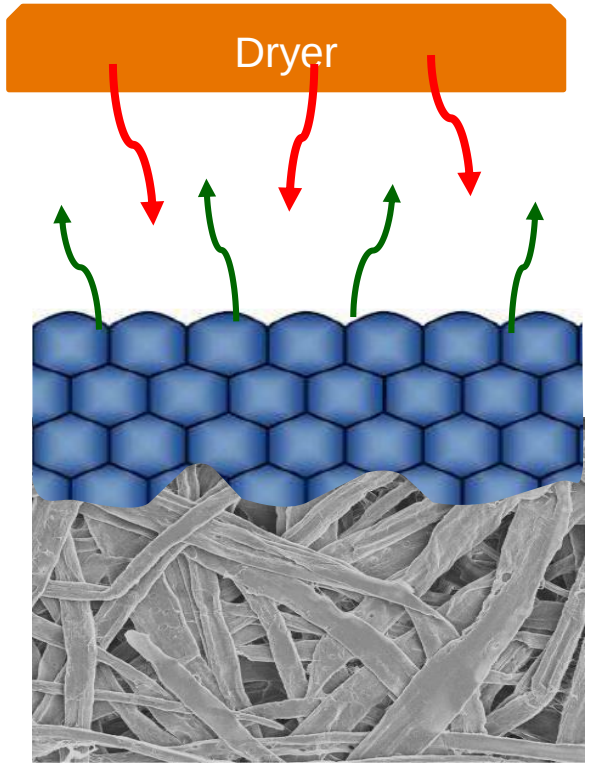
The CORE is engineered to impart various barrier properties

Coating and film formation mechanism

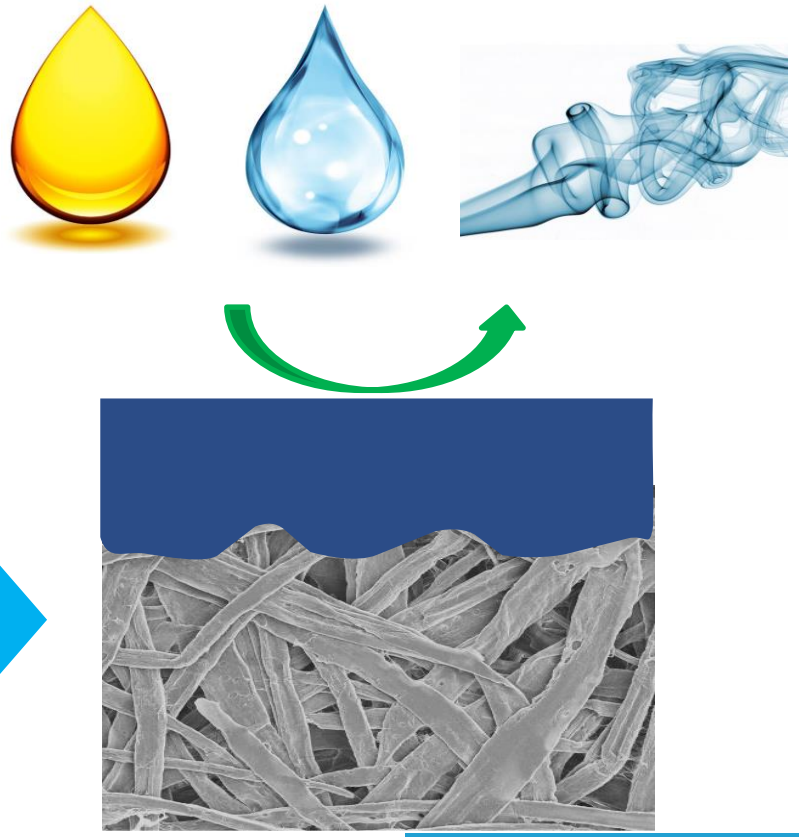
- Coating with aqueous dispersion
- Solids: 40~50%



- Drying and water evaporation
- Deformation



- Perfect film formation
- Solids: ≒ 0%
- Activated barrier performance



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Innovative solutions at BASF

- Commercial cases for:
  - ✓ Oil & Grease Resistance (Short term)
  - ✓ Water Repellency
  - ✓ Mineral oil barrier
- Products comply to stringent food compliance laws (FDA/BFR/GB)
- Recyclability is in main focus

- Advanced stage of launch for paper cups

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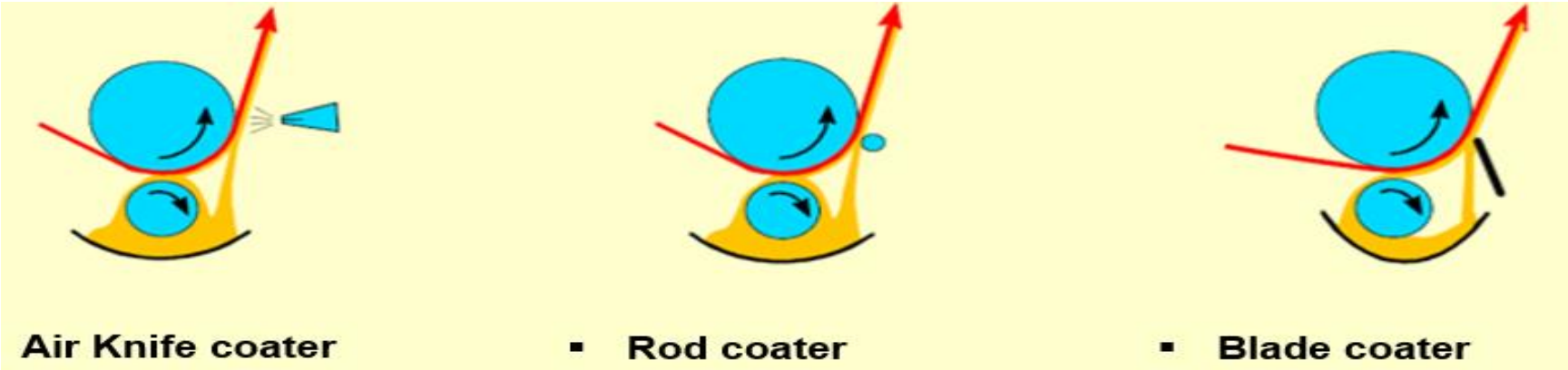
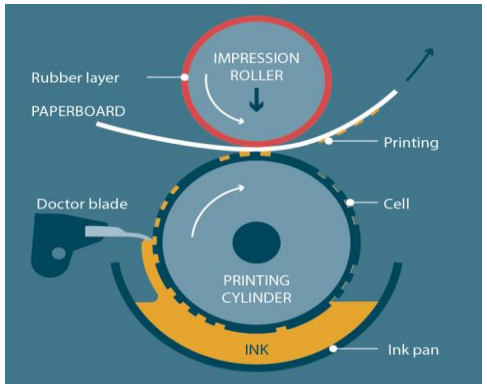
Innovative solutions at BASF

- Available cases include:
  - ✓ On Paper Machine using regular coaters (airknife, bar, blade etc.)

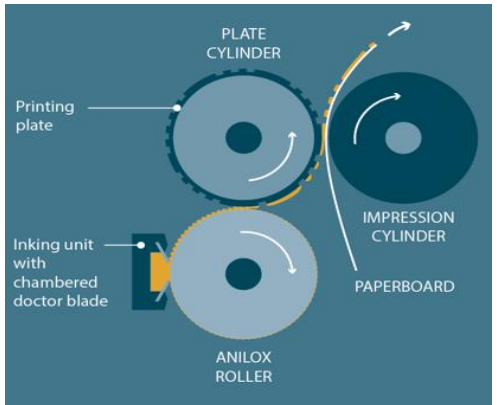


  - ✓ Printer/Convertor applications

gravure



flexo system



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