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# Polyolefin Dispersion – A New Vistas for Flexible Packaging

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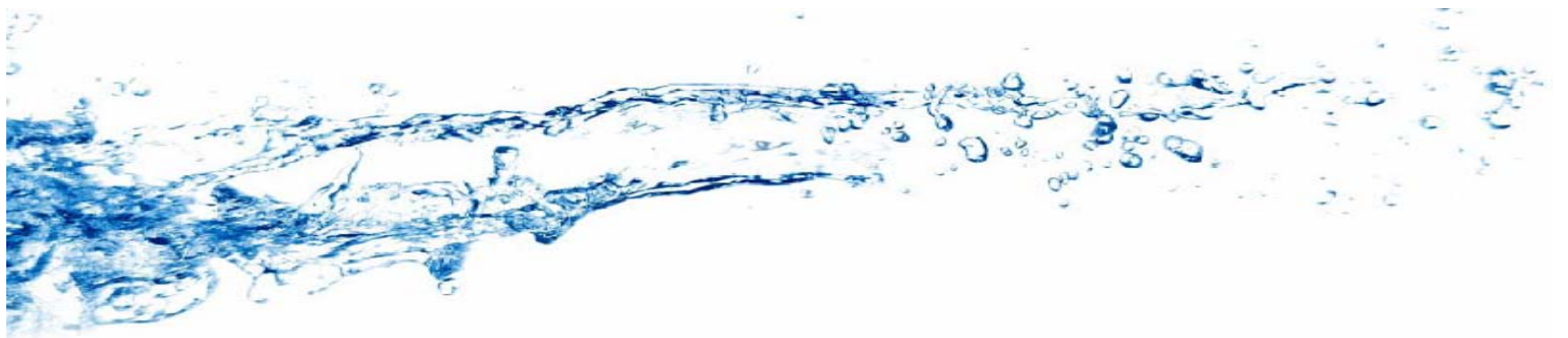
13 - 14, Nov 2009, New Delhi, INDIA

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## Agenda

- Polyolefin Dispersion (POD) Technology
- Polyolefin Dispersion – Chemistry
- POD –Applications and Performance
- Conclusions



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# What comes to mind when you think of polyolefins ?



Plastic Pellets



Films



Molded Articles & Containers

# Waterborne Polyolefin Dispersions

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- 40-55 % Solids , < 500 cps Viscosity



# Aqueous Polyolefin Dispersion

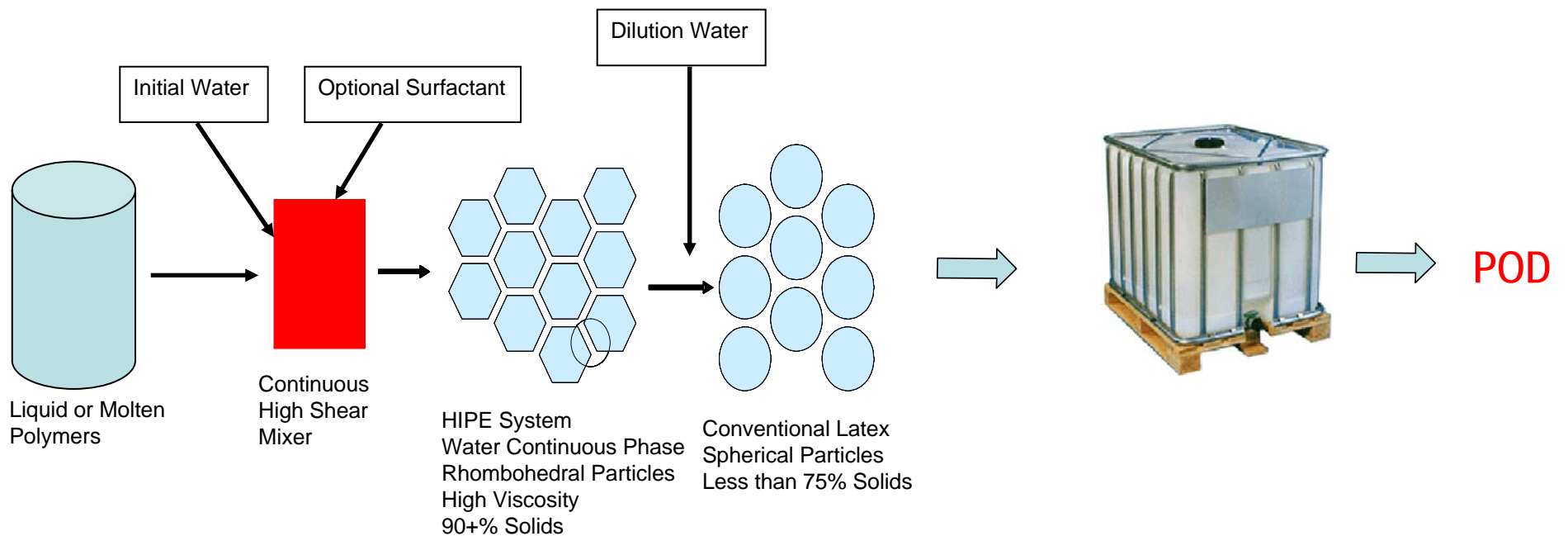
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Dow's proprietary BLUEWAVE™ Technology enables

- » Dispersion of polymers which are not self-dispersing
  - Ethylene /Propylene Copolymers
  - LDPE, HDPE
- » Deliver high molecular weight polymers (>75,000 Mw)
- » Thermoplastic and elastomer formulations
- » Low viscosity – Typically less than 500 cps
- » High solids – up to 60%
- » Solvent free – No solvents added in process

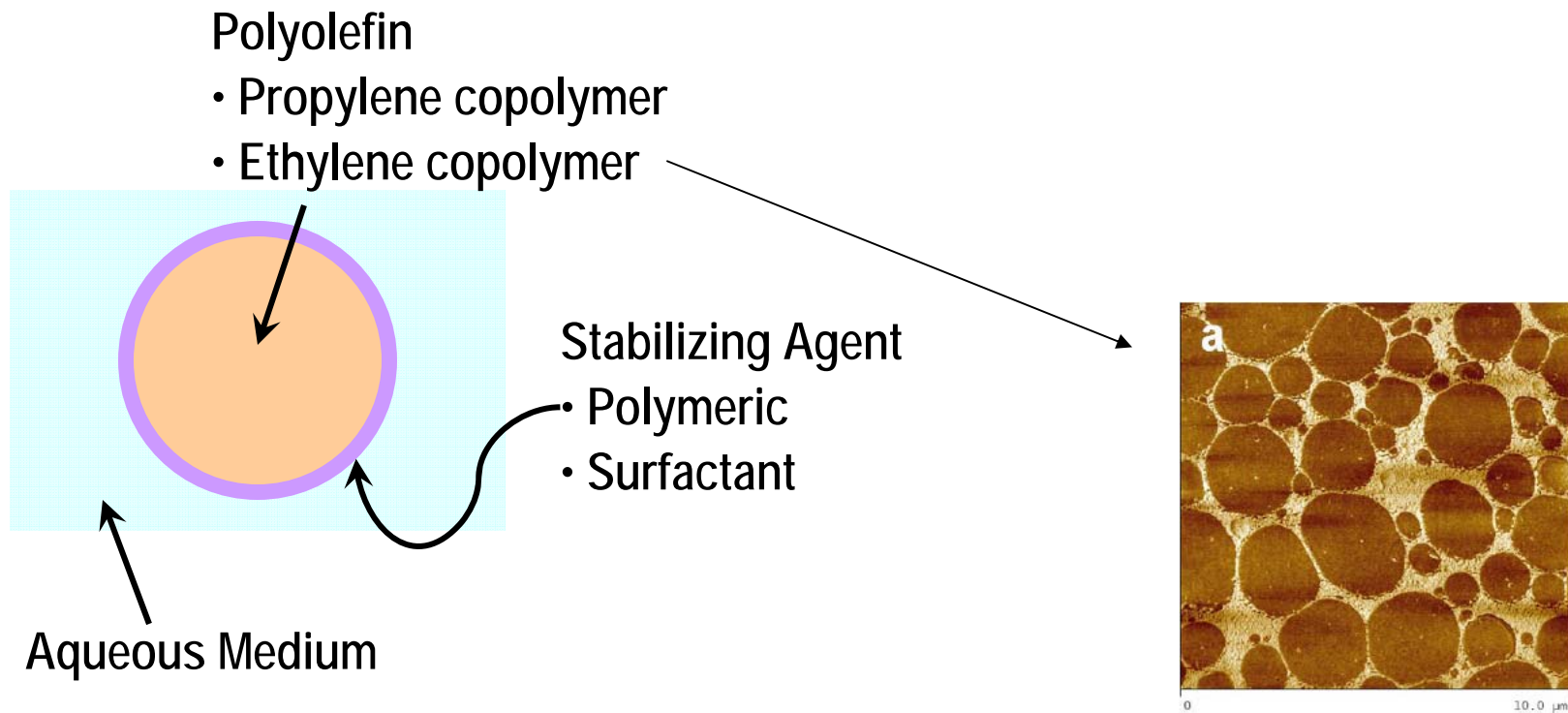
# POD Technology

- Continuous Mechanical Dispersion Process & High Internal Phase Emulsion (HIPE)



# Chemistry – Overview POD Structure

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# Polyolefin Dispersions – Grades

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Product Designation	TAPPI Code	Polymer Composition	Carboxyl Content	Polymer Melting Point (deg. C)	Polymer Tg (deg. C)
DPOD 8501	Dispersion A	Ethylene Copolymer	Medium	63	-53
DPOD 8502	Dispersion B	Ethylene Copolymer	Low	63	-53
DPOD 4501	Dispersion C	Propylene Copolymer	Medium	85	-26
DPOD 4503	Dispersion D	Propylene Copolymer	Low	65	-32
DPOD 9501	Dispersion E	Olefin Block Copolymer	Low	122	-63



# Converting Options for Polyolefin Dispersions

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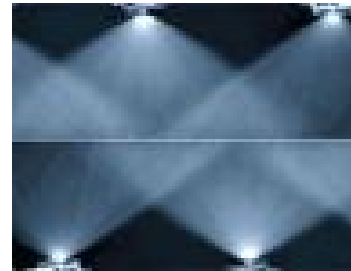
Printing/Coating Processes (Rotogravure)



Dipping



Frothed Foams

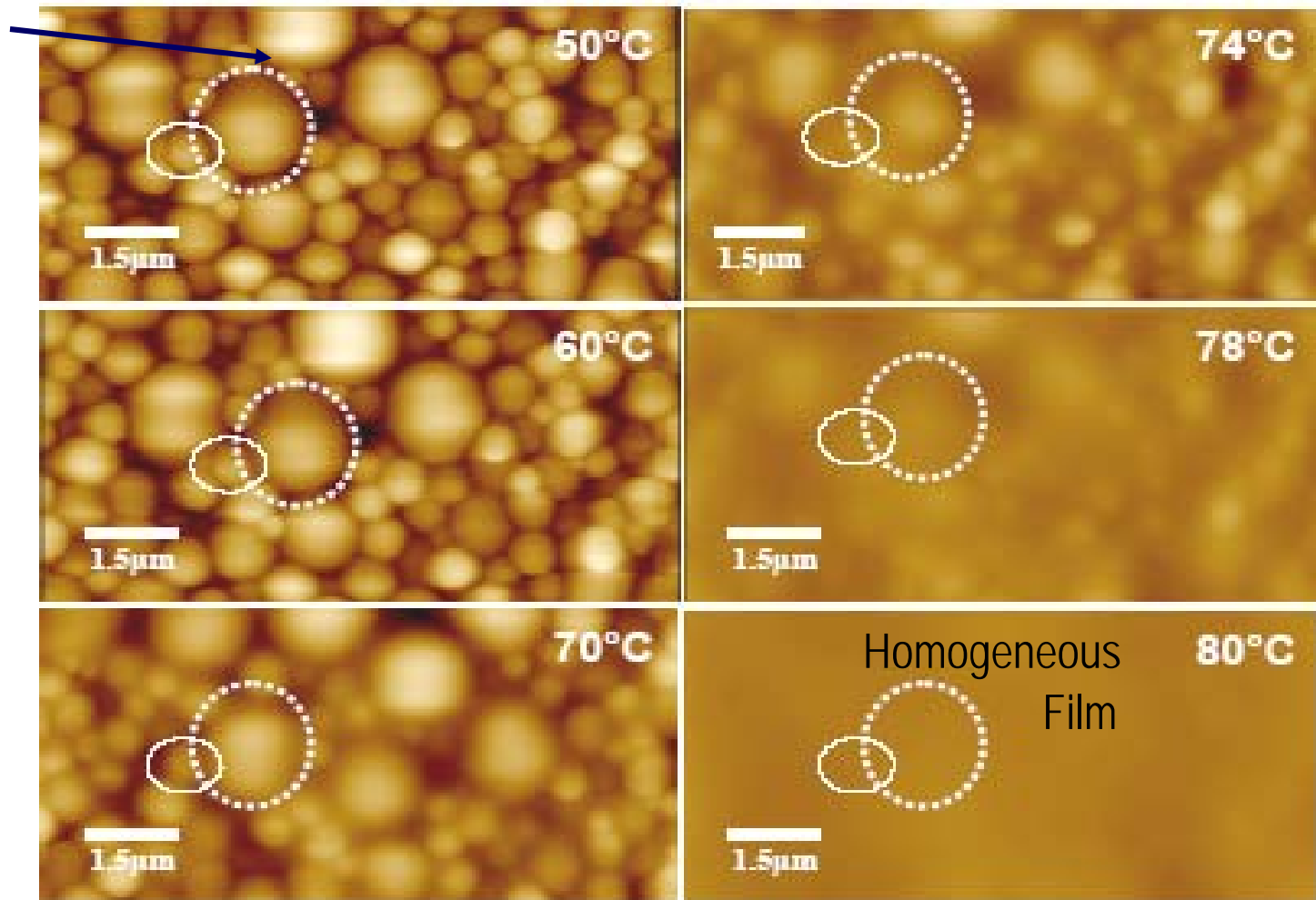


Spray Application

# Film Formation – Hot Stage Microscopy

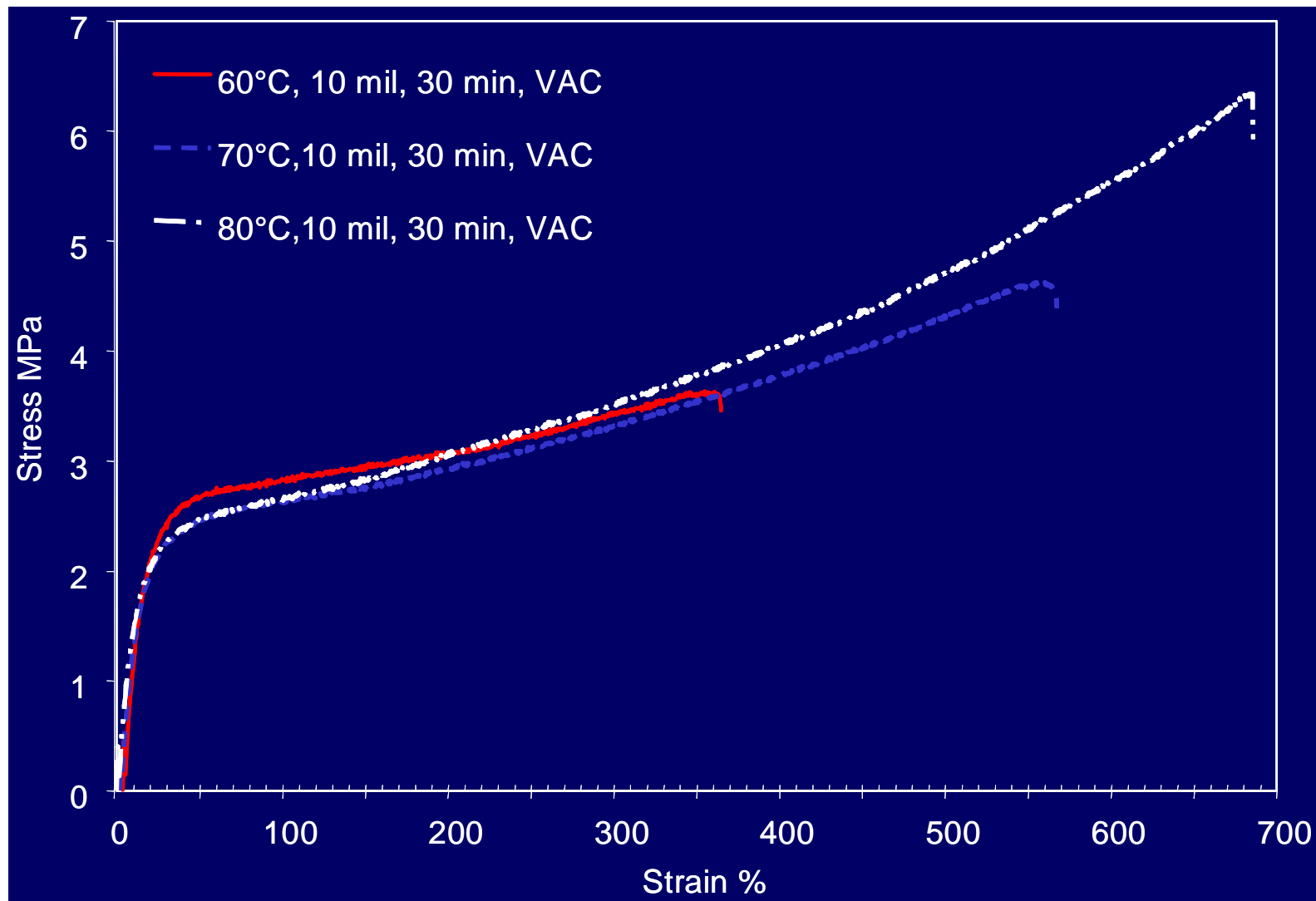
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Polyolefin  
Particles



# Mechanical Properties

- Cast film 250 microns made from dispersion C and dried at different temperatures



# Applications - PODs in Flexible Packaging

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## Tie Layer / Laminating Adhesive

- Alternative to extrusion lamination
  - » Adhesion to polyolefins
  - » Adhesion to polar substrates (paper, glass, foil, polar polymers)
  - » Adhesion to PE based printing inks
  - » Wet sandwich lamination possible



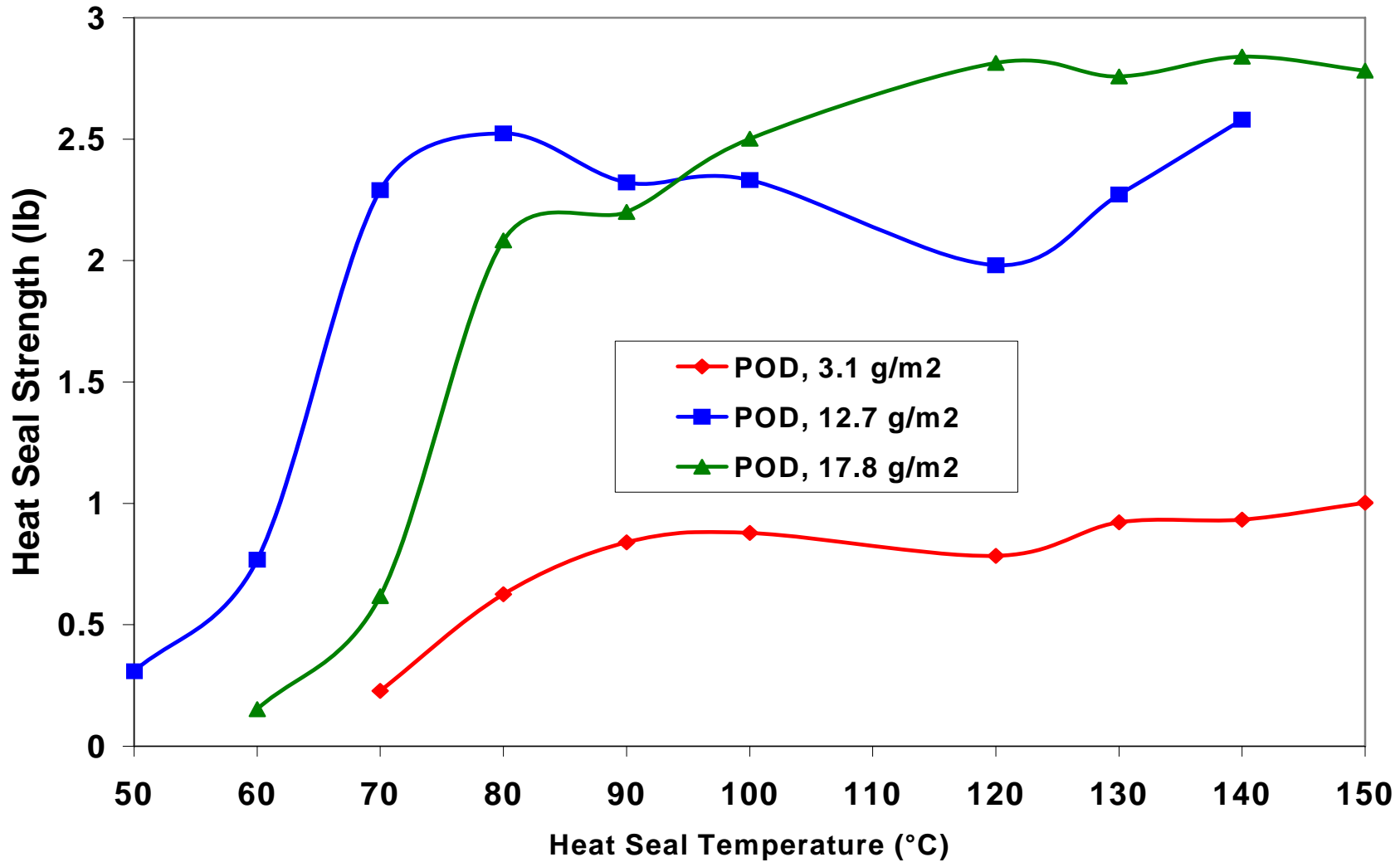
## Heat Sealable Layer

- » Apply at low temperatures and high speeds
- » Low HSIT (<70°C)
- » Use existing printing equipment

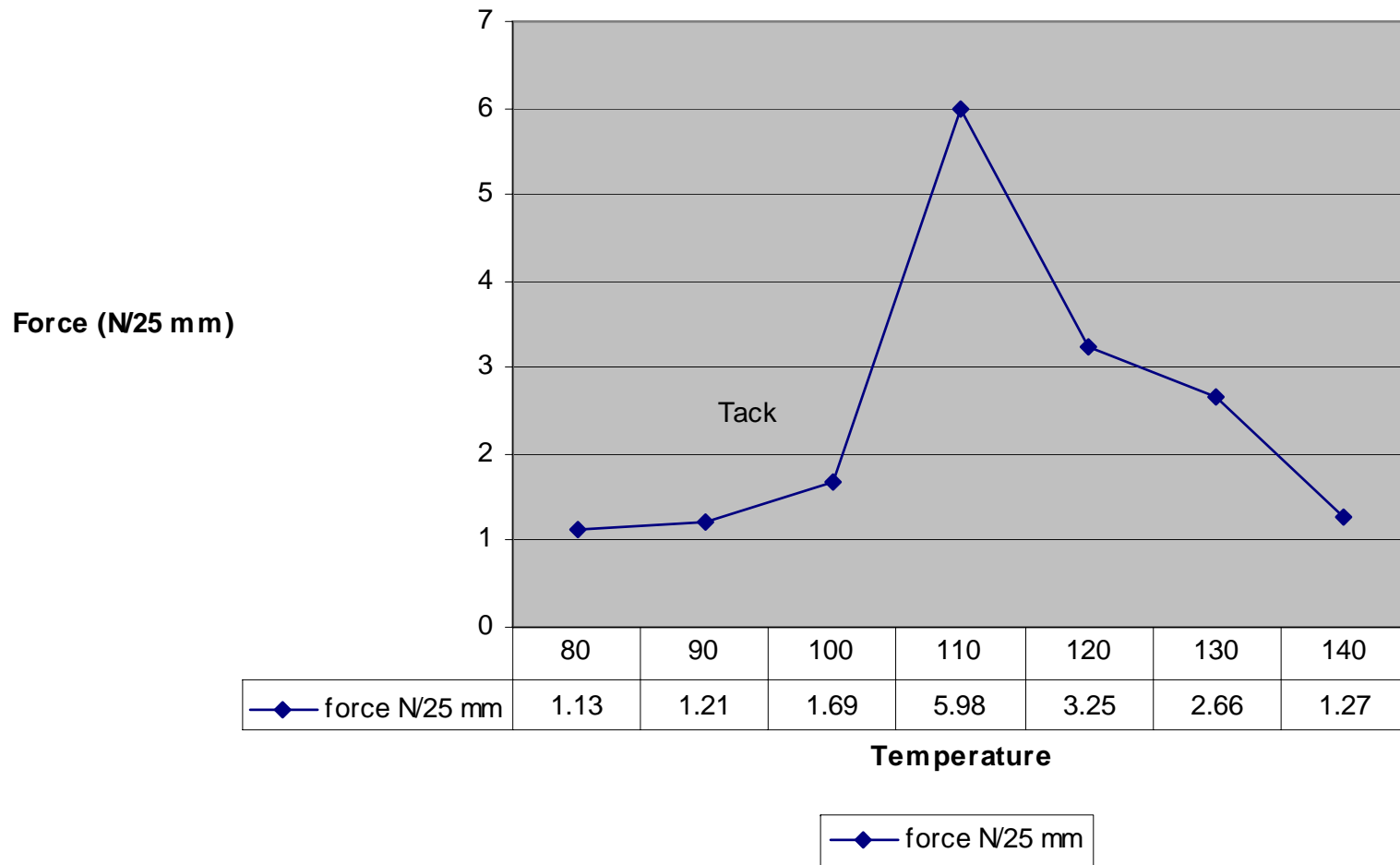


# POD - Heat Seal Strength on BOPP film

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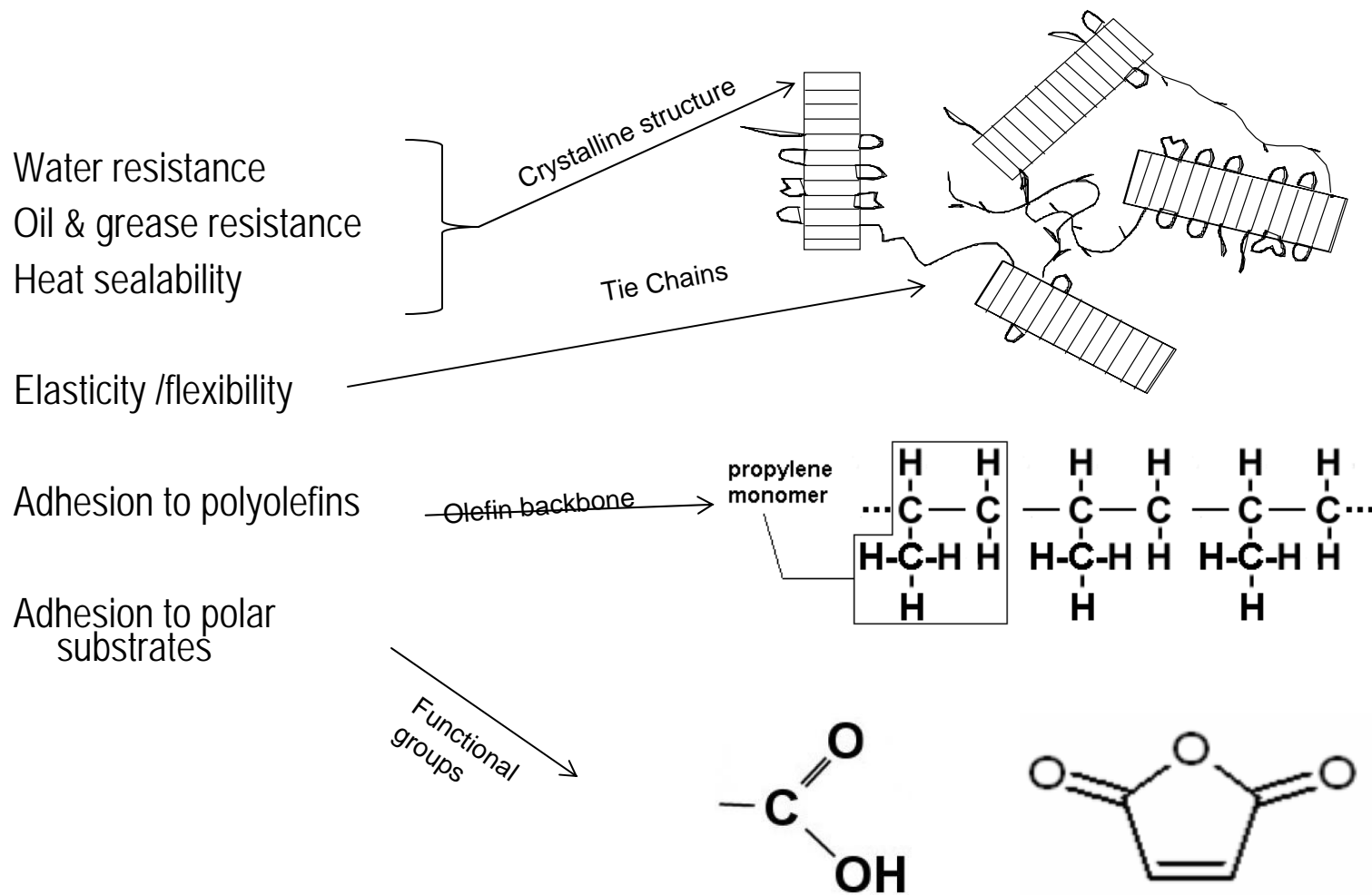


# Hot Tack strength - POD coated Chromo Paper



- Substrate: 70 gsm Chromo Paper
- Dispersion: Propylene Based Dispersion C
- Add-on coating: 5 gsm

# Key Properties of PODs for Flexible Packaging



# Application- Paper Coatings

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- Extruded polyolefins have been widely used to modify paper
- Limitations exist for extruded polyolefins
  - » Thickness (> 10 microns)
  - » Adhesion to paper
- Beneficial properties of PODs provided to paper and board
  - » Oil and grease barrier
  - » Moisture resistance
  - » COF modification
  - » Adhesion promoter / tie layer
  - » Heat sealability

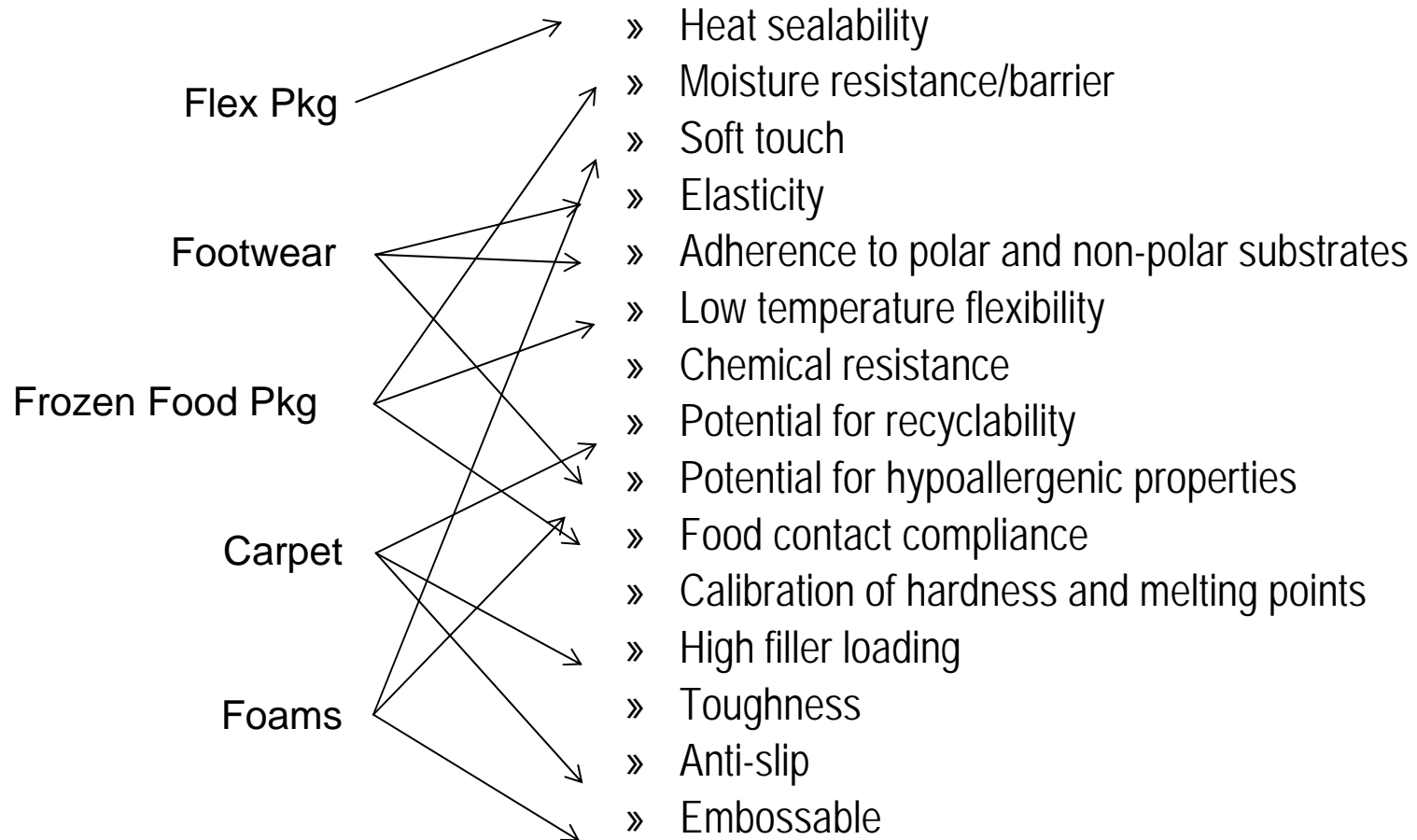




# Applications and Properties

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Unique Balance of Properties (not possible with conventional dispersions)



# Summary: Polyolefin Dispersions – Applied Innovation

- In POD- polyolefin dispersions put high molecular weight polyolefin in water based dispersion to enable customers to create differentiated products or structures, eliminate solvent related issues and/or lower system cost

## Positive performance of the Polyolefin

- Heat Sealability
- Low temperature flexibility
- Water & Chemical Resistance

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## Application benefit of water borne system

- Adhesion to polar substrates
- Acceptance of inorganic fillers
  - Low Viscosity application
- Can be used as an additive in latexes

## Polyolefin dispersions promote Differentiation and growth

### Waterborne Application Vs Extrusion Coating

- Thinner Coating
- Use existing waterborne application equipment
- Higher Line speed
- Penetrate porous/fibrous webs
- Coat at low temperature
- Coat complex geometry
- Coat in Pattern



**Thank you!**

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