

Coating layer microstructure and location of binder - results from SEM analysis

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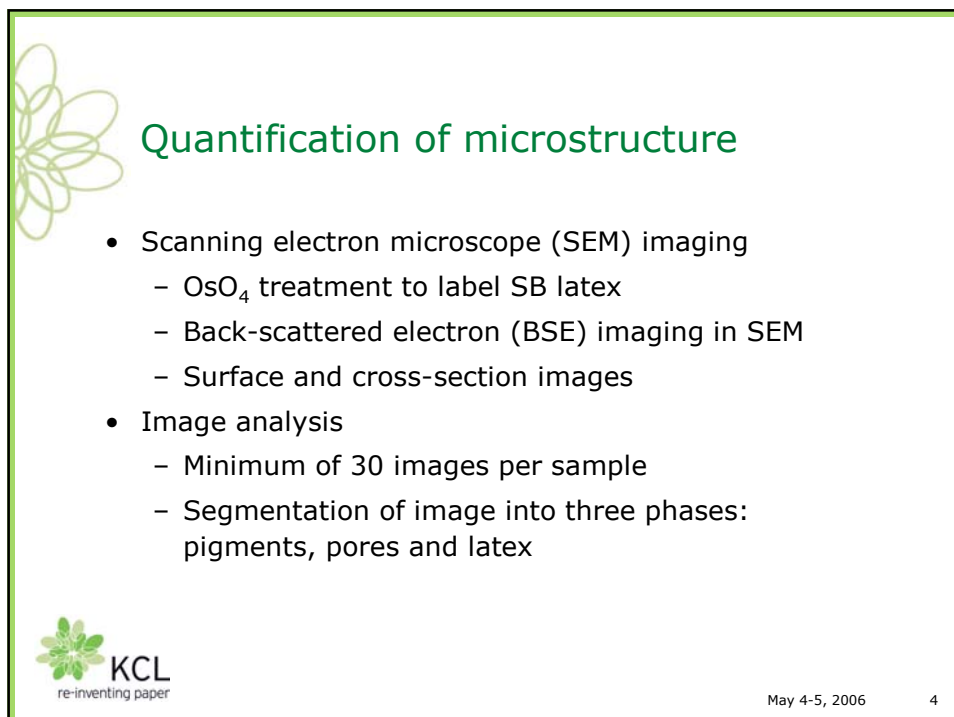
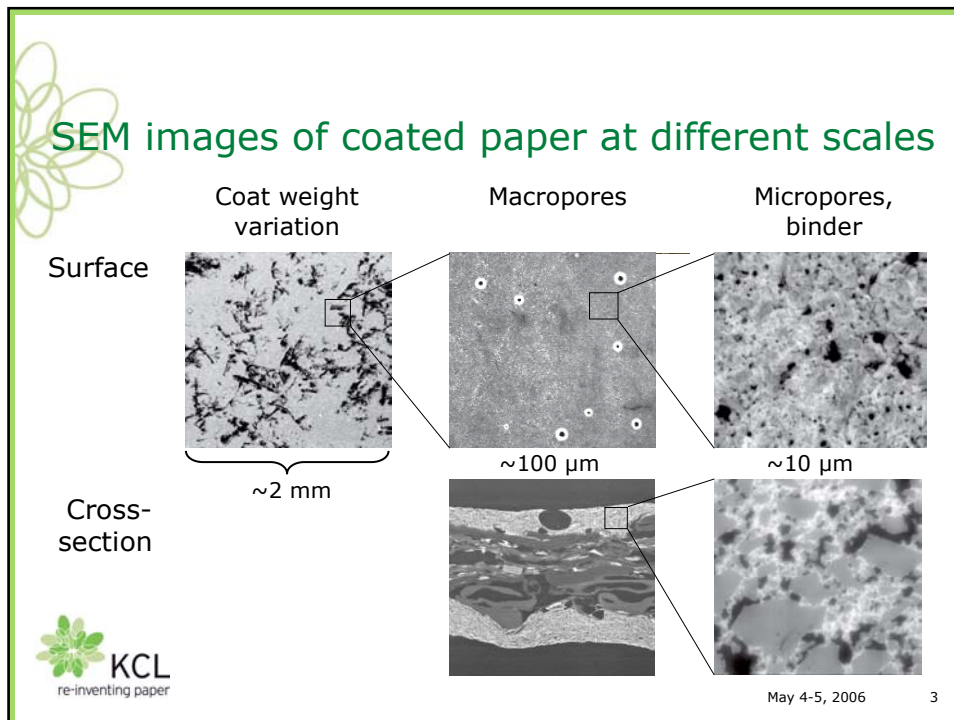
Outline

- Introduction
- Quantification of coating pore structure
- Comparison of SEM and mercury porosimetry
- SB latex analysis
- Summary



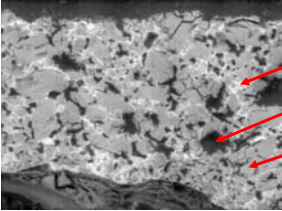
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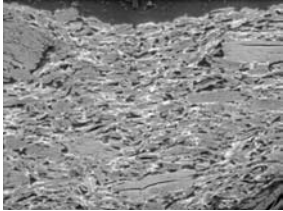
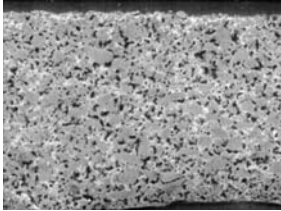
Images of coating cross-sections

HC60
Coarse carbonate



SB latex
Pore
Pigment

SetaCarb
Fine carbonate



SPS
Platy English clay

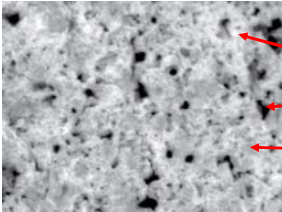
KCL
re-inventing paper

Image size 19x14 μm^2

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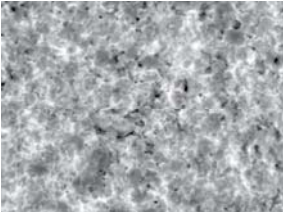
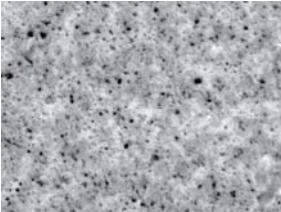
Images of coating surface

HC60
Coarse carbonate



SB latex
Pore
Pigment

SetaCarb
Fine carbonate




SPS
Platy English clay

KCL
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Image size 25x19 μm^2


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Parameters for coating layer structure

- Porosity [%], pore dimensions [μm]
- Pore orientation [degrees]
- Latex area fraction [%]
- Z-directional distributions for porosity and latex

- ✓ Both coating surface and cross-section ☺
- ✓ Measures only coating layer(s) ☺
- ✓ Images for visual examination ☺
- ✓ Two-dimensional estimate ☺



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Coatings with different pigments

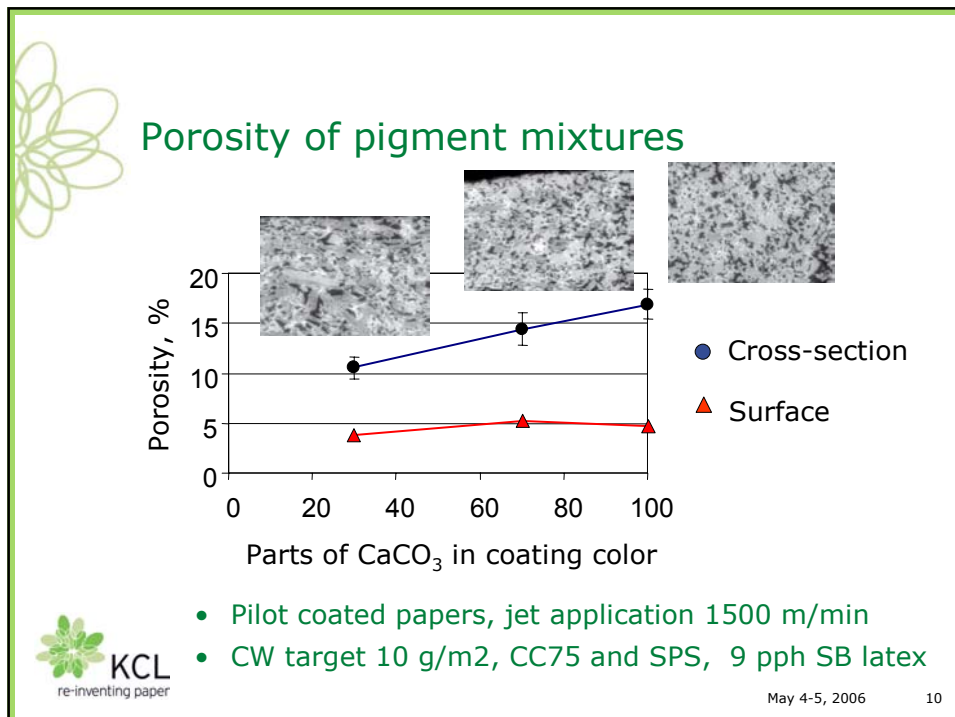
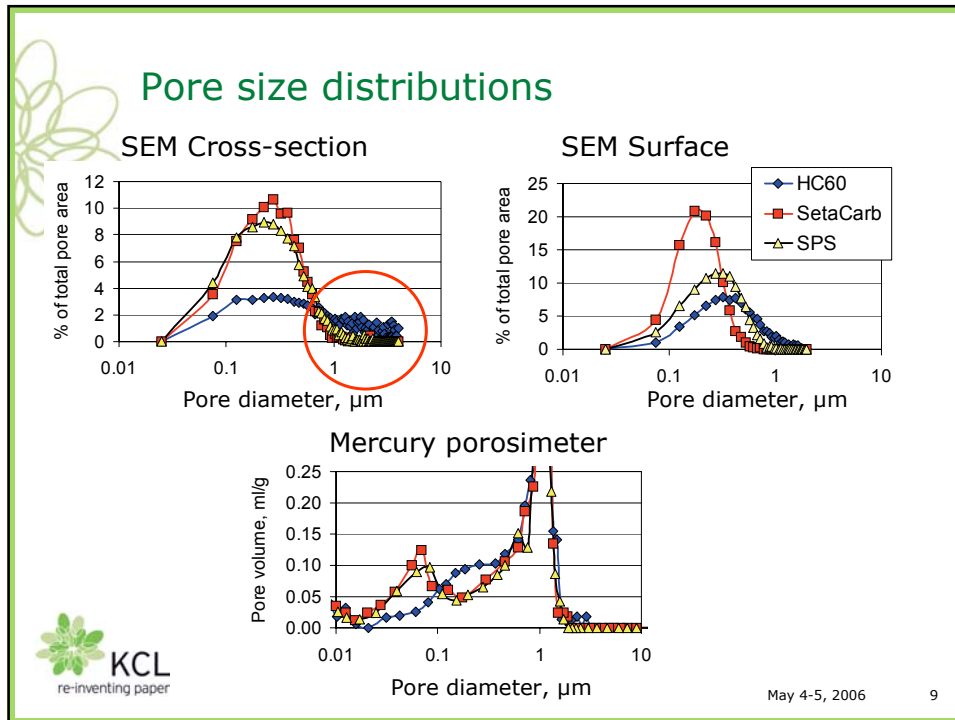
Parameter	HC60	SetaCarb	SPS
Porosity in cross-section [%]	19.5 \pm 1.9	13.2 \pm 0.4	12.4 \pm 0.8
Porosity on surface [%]	5.2 \pm 0.2	6.4 \pm 0.3	4.2 \pm 0.2
Number of pores on surface [$\#/\mu\text{m}^2$]	0.83 \pm 0.04	3.43 \pm 0.09	1.25 \pm 0.07

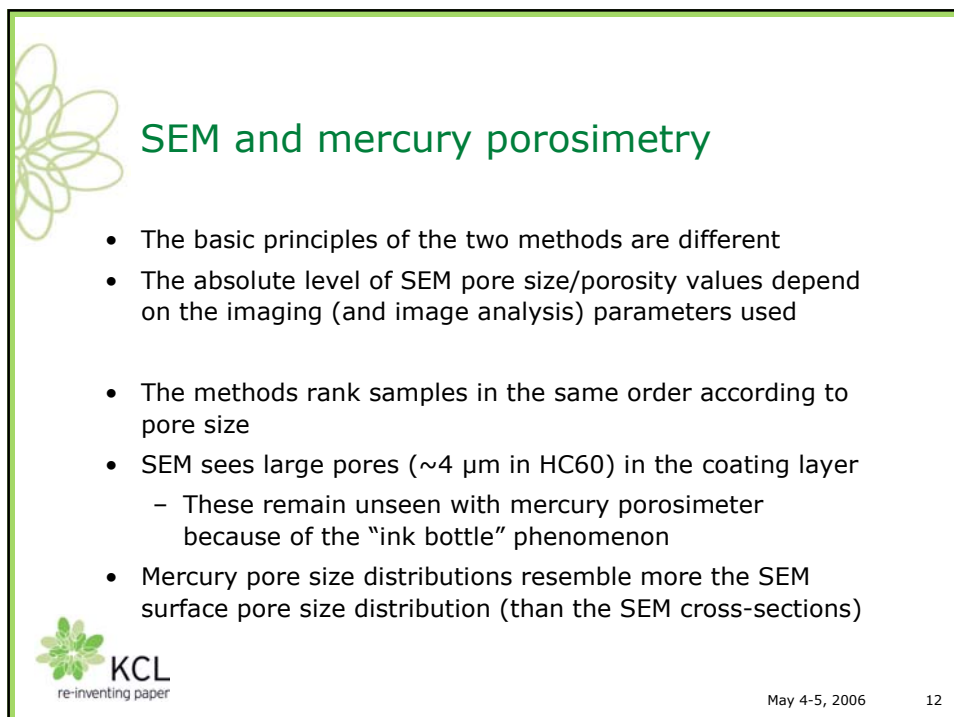
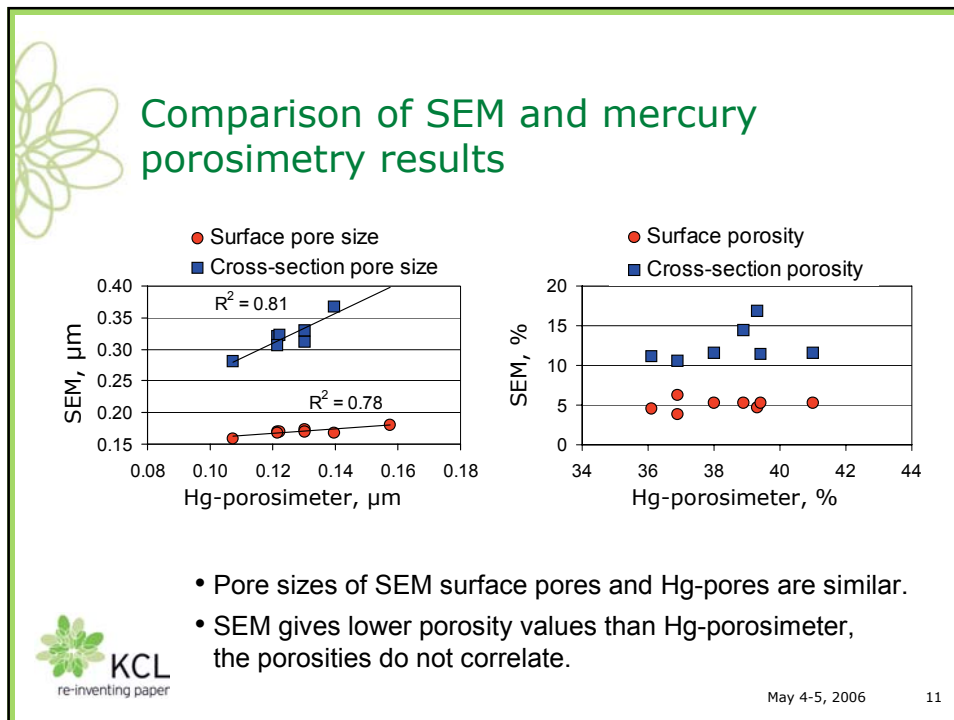
\pm 95% confidence interval

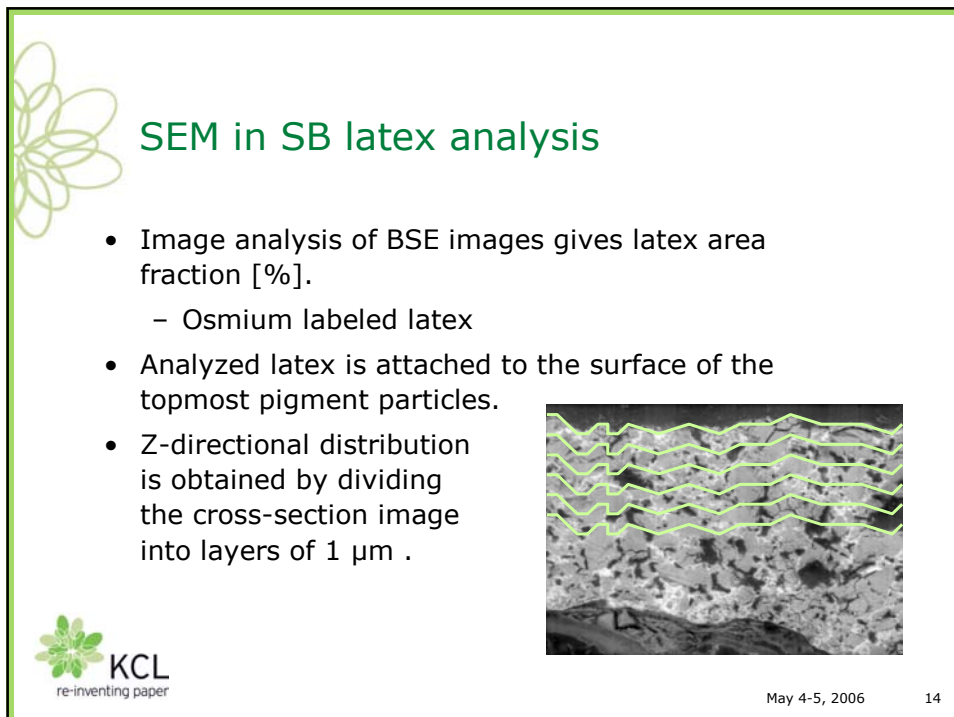
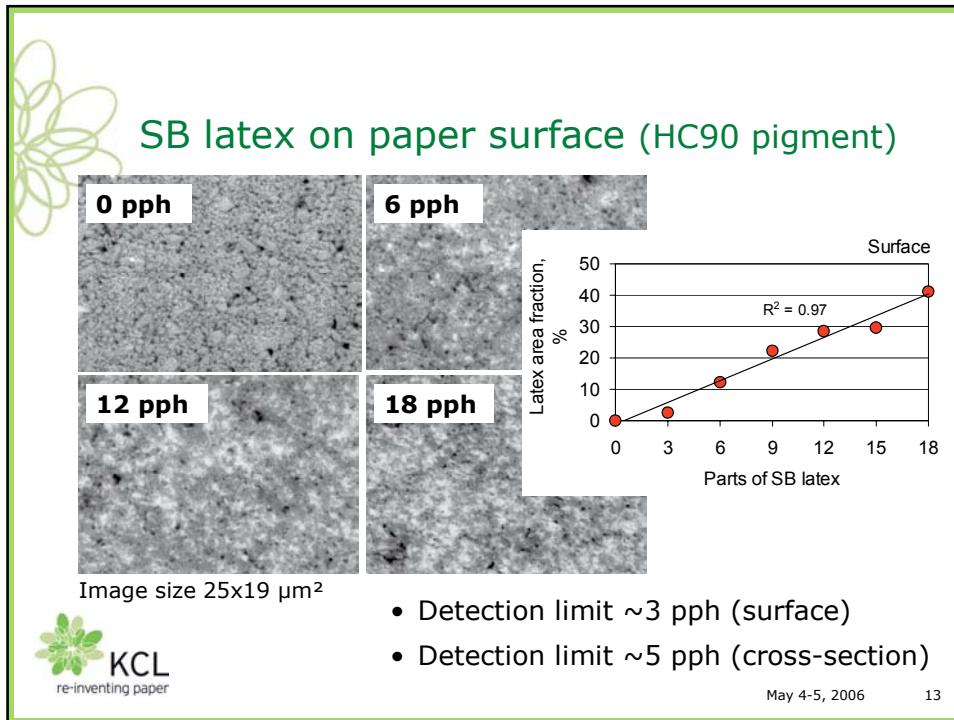
- Pilot coated papers, jet application 1500 m/min
- Coat weight target 12 g/m², 11 pph SB latex

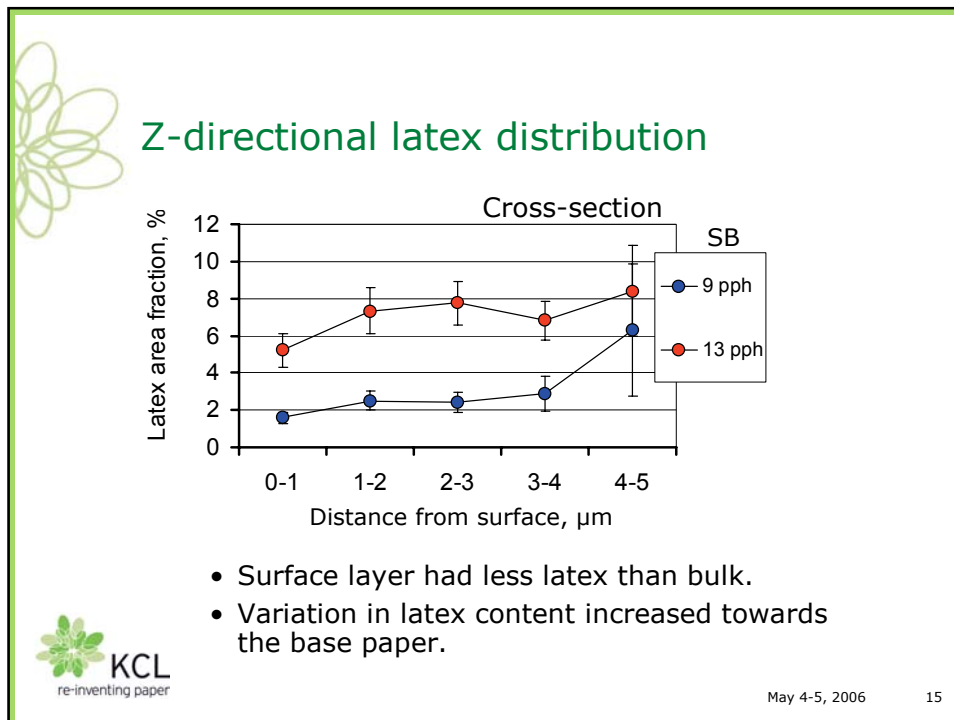


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- ### Summary
- Coating layer microstructure is quantified with SEM and image analysis.
 - new information compared to mercury porosimeter
 - new method for SB latex quantification
 - Cross-section and surface images give supplementary information.
 - pore dimensions and porosity are main results
 - z-directional porosity and latex distributions.
 - topcoat and precoat can be analyzed separately
- KCL**
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