Towards Electrochromic Windows via Roll-to-Roll Processing

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European Smart Windows Conference

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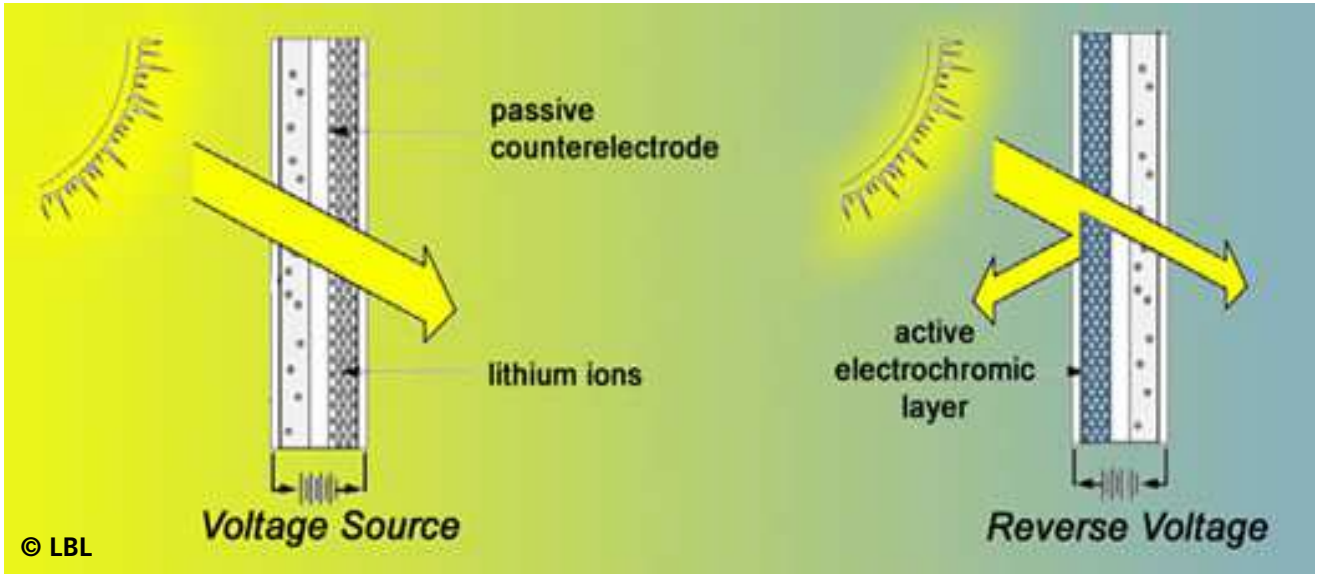
What are EC windows good for?

- *Smart solar heat & day light control:*
  - Individual layout of work place environments
  - Improvement of energy efficiency in buildings*: Huge potential for savings (up to 30 %), in particular in hot climates.
  - Lowering the Carbon Footprint

*as compared to standard glazing



Smart windows - Why is there still a need for R&D?

- **High perfomance electrochromic windows are available on the market**

EControl-Glas

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Motivation

- *Apply smart glass principles to plastic film:*
  - mechanical flexibility
  - weight
  - safety
  - retrofitting possibility
  - energy, time and cost efficiency (LCA performed)
  - high-throughput production techniques

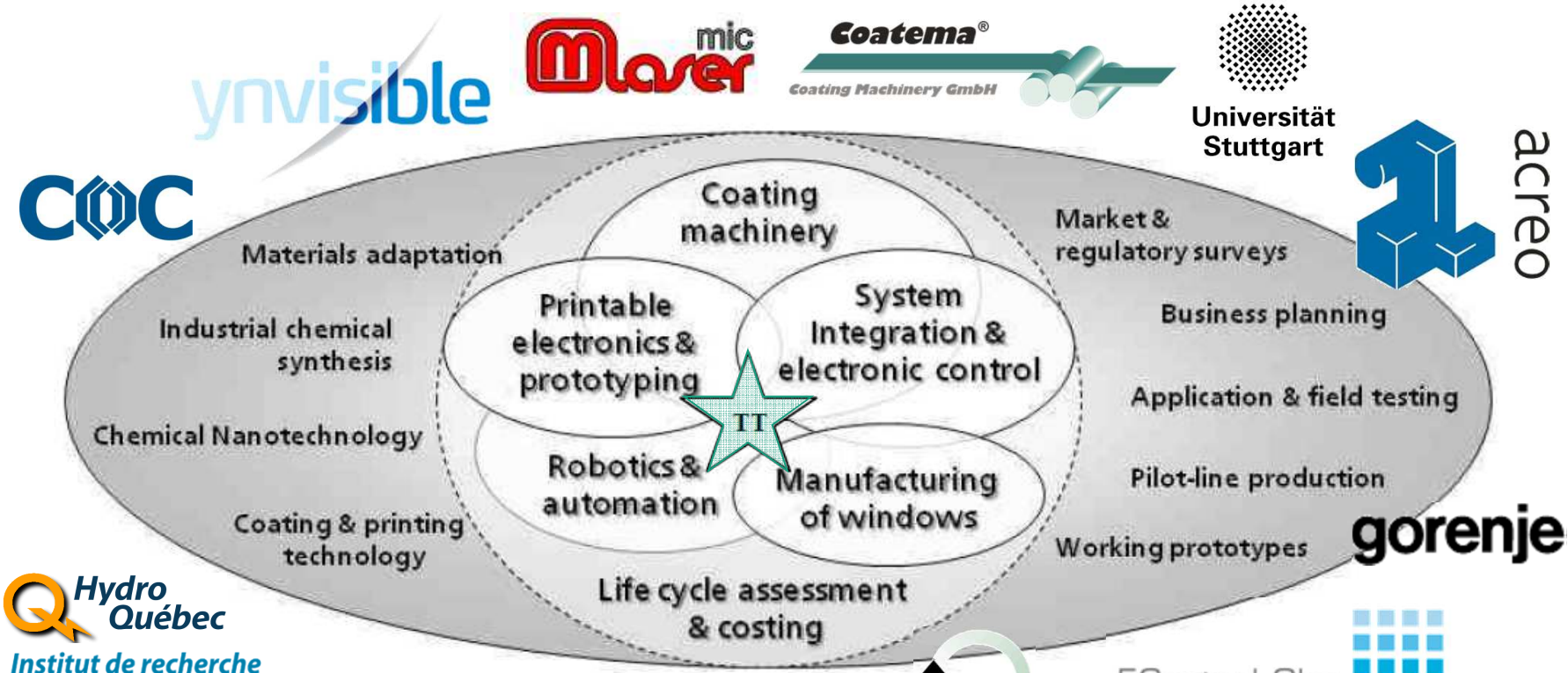
(Application example)

„Production costs and process simplification are major issues for large area switchables.“

Carl M. Lampert, Star Science, 2004

The EELICON Project

EELICON
SMART LIGHT TRANSMITTANCE CONTROL



13 partners from 8 countries

Bridging the innovation gap

EELICON
SMART LIGHT TRANSMITTANCE CONTROL

Pilot-line phase

- Pilot-lines/plants set-up
- Pilot-line production of benchmark devices
- Market studies and business case development
- Life cycle costing
- Employment of robotics for process automation

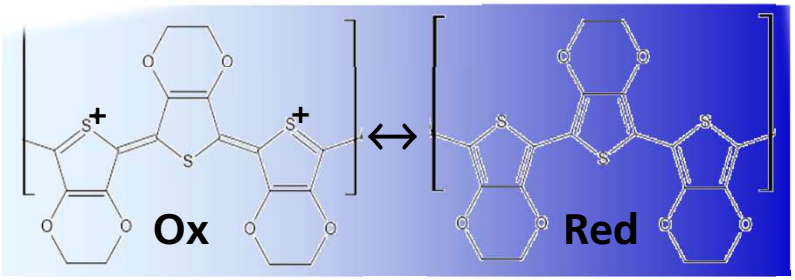
Validation

- Technology validation
- Materials optimisation
- UV Protection and sealing
- System integration and electrical control
- Process automation and bus bar printing successful
- Exploitation strategy development

Prototype phase

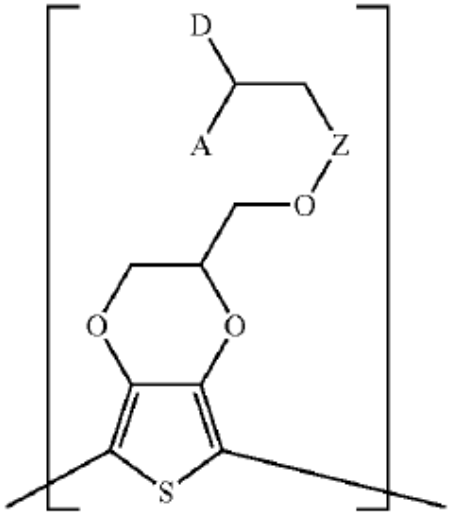
- Technology transfer
- Staff exchange
- Prototype production
- Sampling and dissemination
- Life cycle assessment
- Cost target achievement
- Business planning
- SME scouting

"INNOSHADE" technology

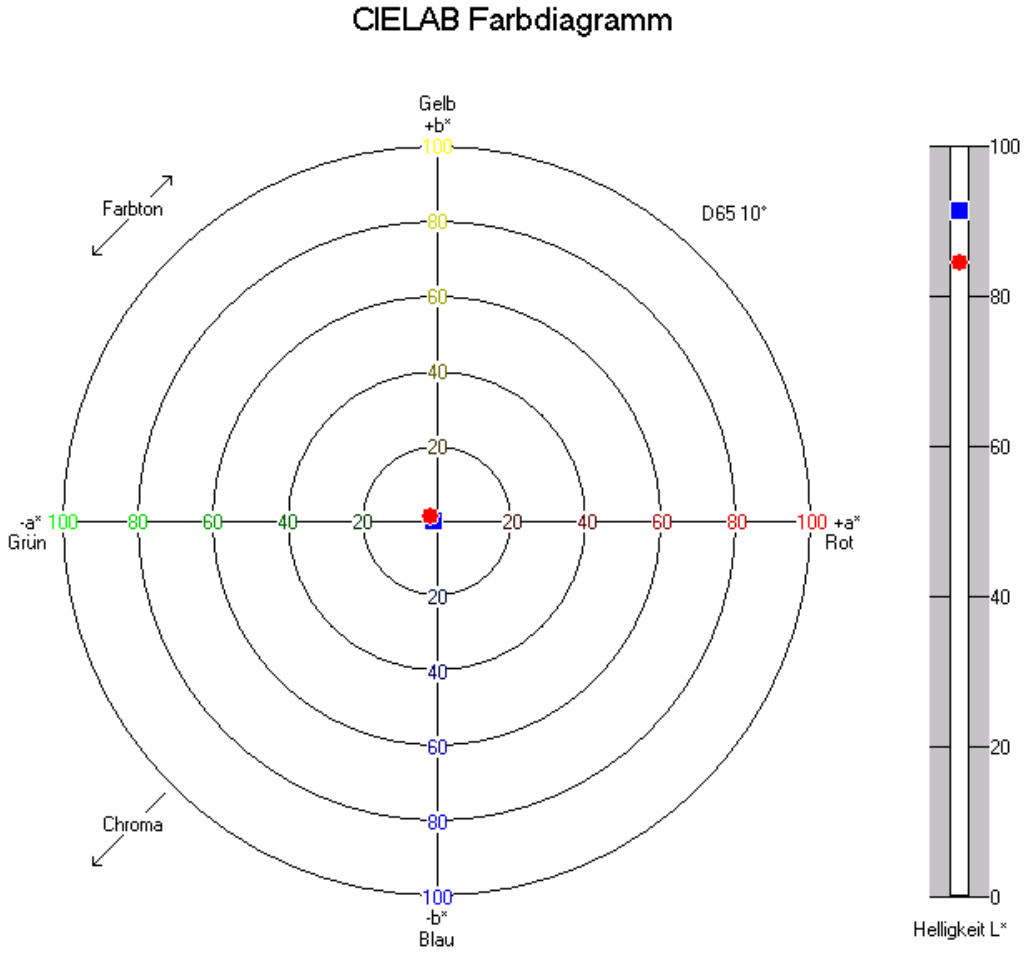


High-throughput prototype production for flexible & retrofit-enabling electrochromic film devices in Europe.

Patented EC polymers...



Reference	Sample
L* = 91.53 a* = −1.08 b* = 0.38 D65 10°	L* = 84.52 a* = −2.16 b* = 1.49 D65 10°



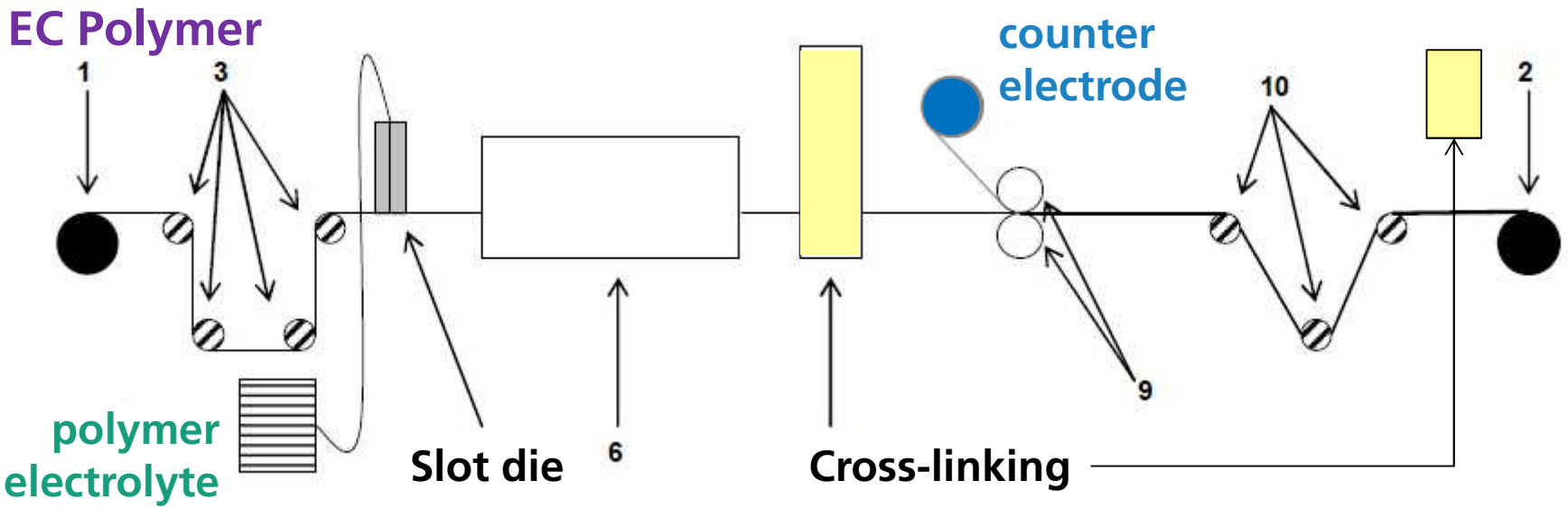
→ No blue hue in bright state!

→ Virtually colourless, like reference!

■ Device without polymer (dummy)

● Device with new polymer

...and processes



Protective liners, bus bars, sealing etc. omitted

EELICON pilot line and pilot plant

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Coatema®
Coating Machinery GmbH

COC

Fraunhofer ISC

Preparation of electrodes (“half-cells“)

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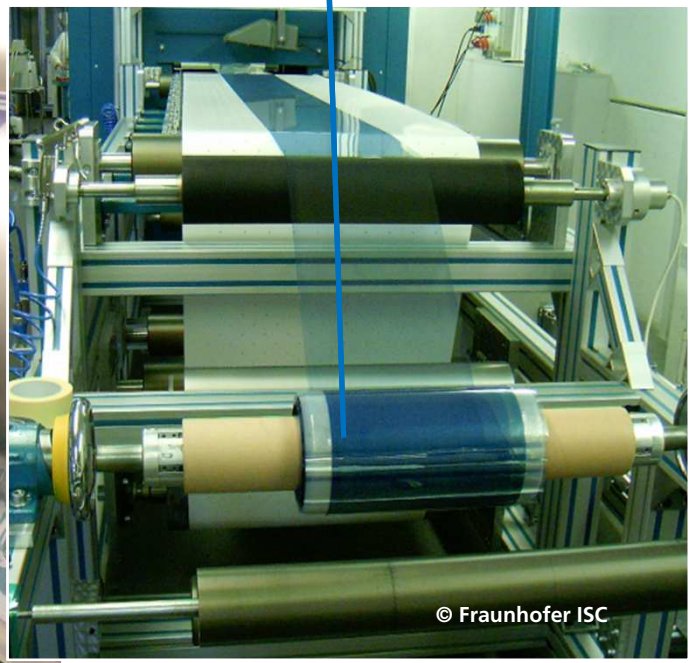

Coatema®
Coating Machinery GmbH

Status:
scaling up to 500 mm

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Stand-alone electrochromic film

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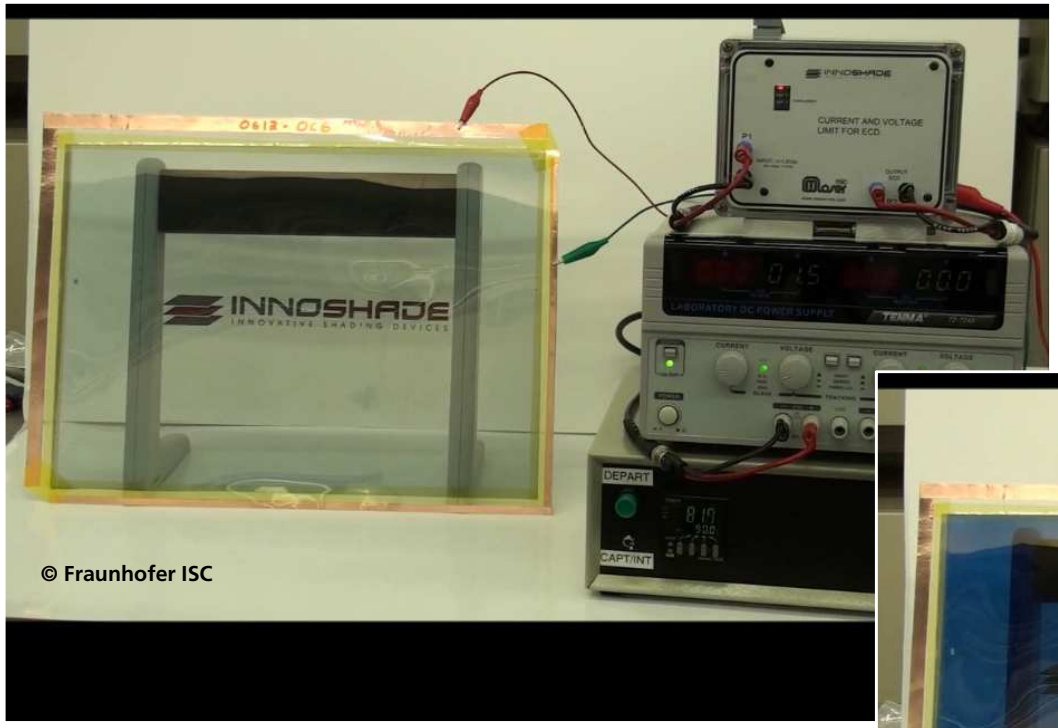

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www.youtube.com/watch?v=kGvWHMQntS0

- Manually assembled lab prototype
- High bright state transmittance
- Response time 15/30 s (80/90%)
- 120k cycles under lab conditions

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Thank you
for your kind attention!

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