ActInPak

Irreversible thermochromic printing inks suitable for application on food packaging

Spin-out

NATIONAL INSTITUTE OF CHEMISTRY

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MYSTERIA COLORUM D.O.O.

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Slovenija

Financial support

EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND

Innovation

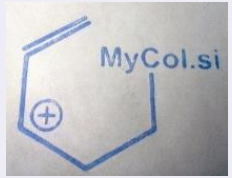
properly stored

overheating

Permanent (irreversible) colour change

overheated

any design



flexible labels / printing directly on packaging

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Pilot example

Screen printable ink

- irreversible thermochromic
- water-based
- activation temperature: 9 ± 1 °C
- formulated and manufactured by MyCol d.o.o. Slovenia

Printed on self-adhesive labels (paper, foil)

→ **temperature indicator for cold chain applications**

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Demonstration & measurements

GHP-01 - Temperature controlled plate (Kambič d.o.o. Slovenia)
(custom made for MyCol)

- two heating-cooling plates: 4x4 cm (Peltier system)
- temperature ranges:
  - from -10°C to +95°C (cold plate)
  - from +40°C to 250°C (hot plate)
- control panel with touch display
- adjustable heating/cooling speed (°C/h)

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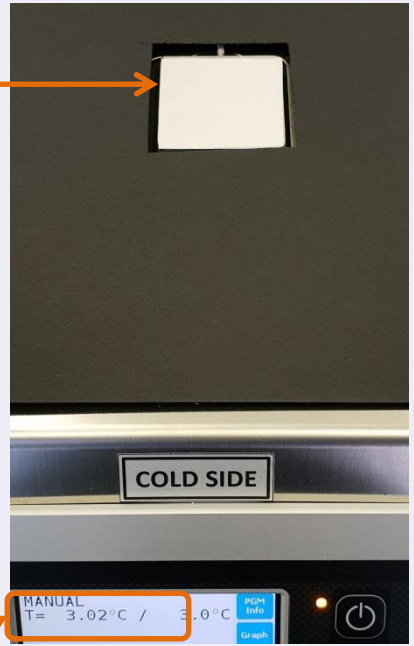
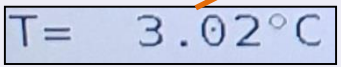
Pilot example - demonstration

Measuring site
with label
(4 printed squares,
1x1 cm each)





Temperature controlled plate HGP-01

The label is attached on the measuring site (cold plate, region -10°C to +95°C)

… and cooled down to 3 °C

the printed spots are white

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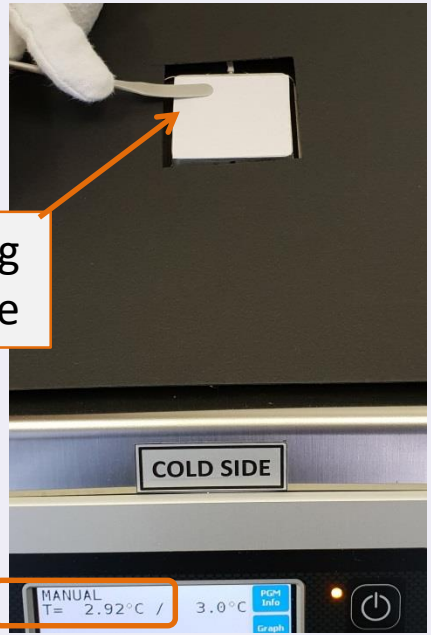
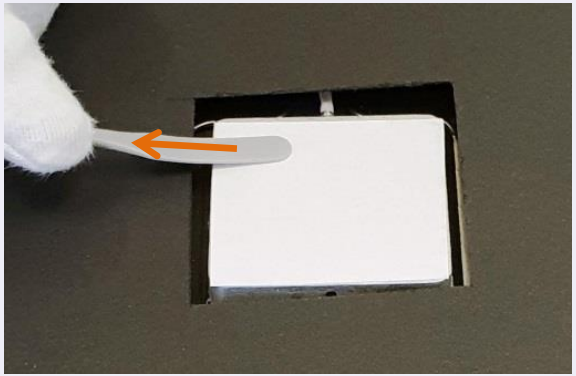
Pilot example - demonstration



activating
upper left square

T= 2.92°C

Activating with a cooled spatula



→ the activated region remains white

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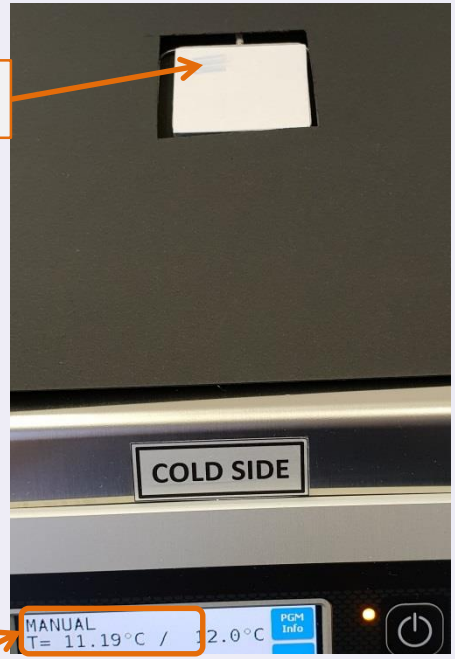
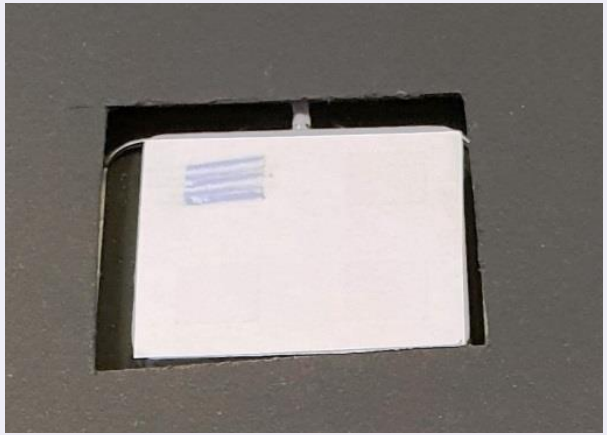
Pilot example - demonstration

the activated square



T= 11.19°C

heating above 10 °C



→ the activated region colours

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Pilot example - demonstration

Activating bottom left square

The colour of top left square little fade
The bottom left square remains white

Heating above 10°C

The activated regions on both squares colour

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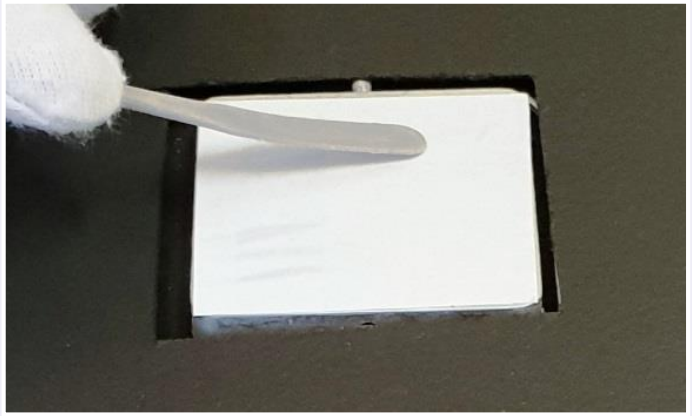
Pilot example - demonstration

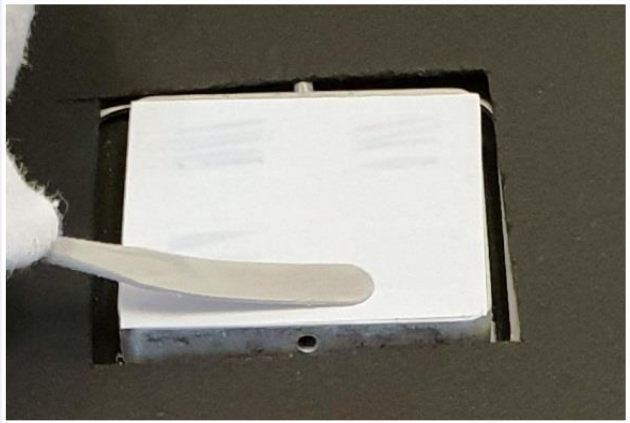
Activating top right square



Heating above 10°C

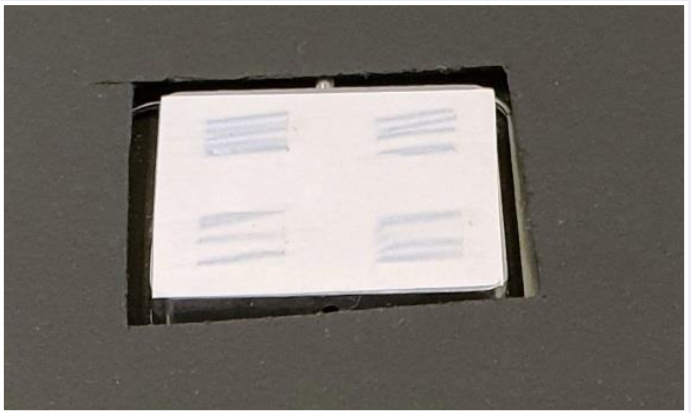
Pilot example - demonstration

Activating bottom right square



T= 2.60°C

Heating above 10°C



T= 11.68°C

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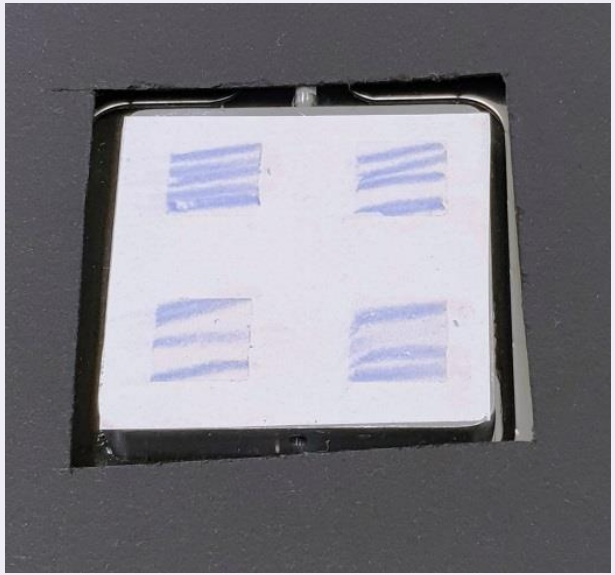
Pilot example - demonstration



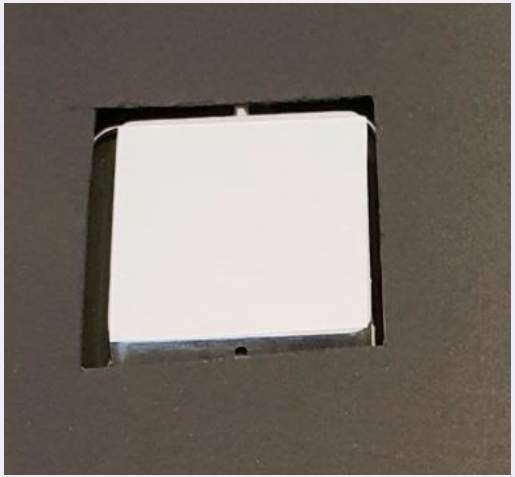
Activation was made at ≤ 3°C with a cooled object.

When heated above 10°C only the activated part colours.

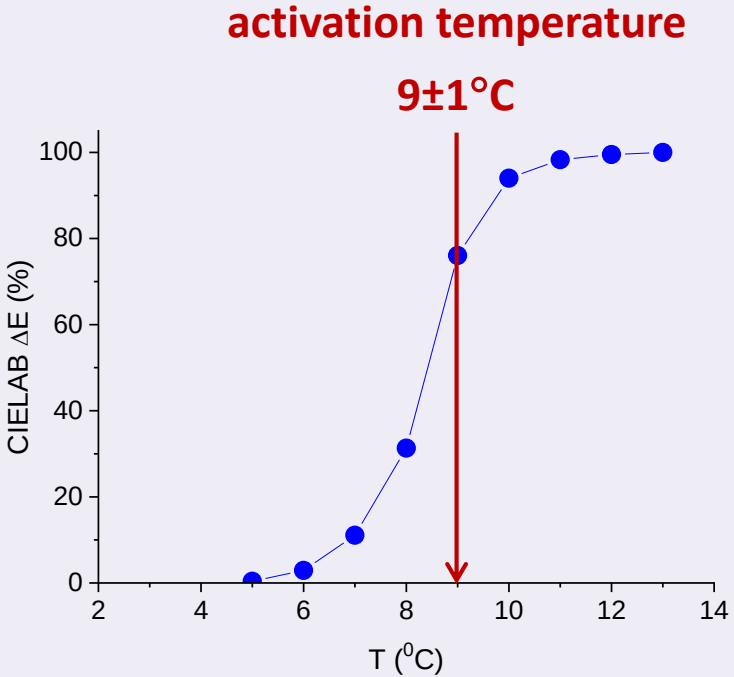
When cooled well below 8 °C, the coloured patches little fade, but the colouration is regained with heating above 10 °C.

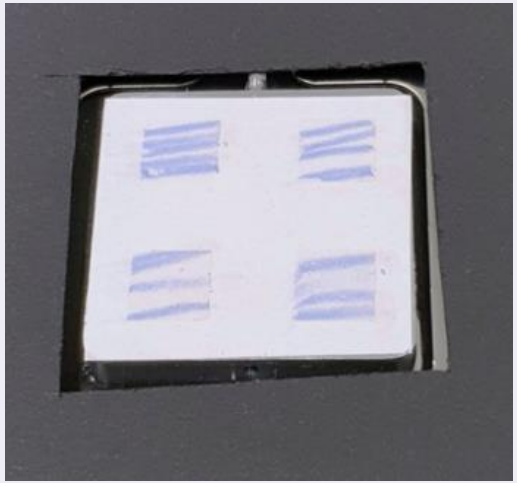
→ **Irreversible thermochromic**

Pilot example - quantification



≤ 3 °C





≥ 10 °C

Ireversible temperature sensitive colour changing ink

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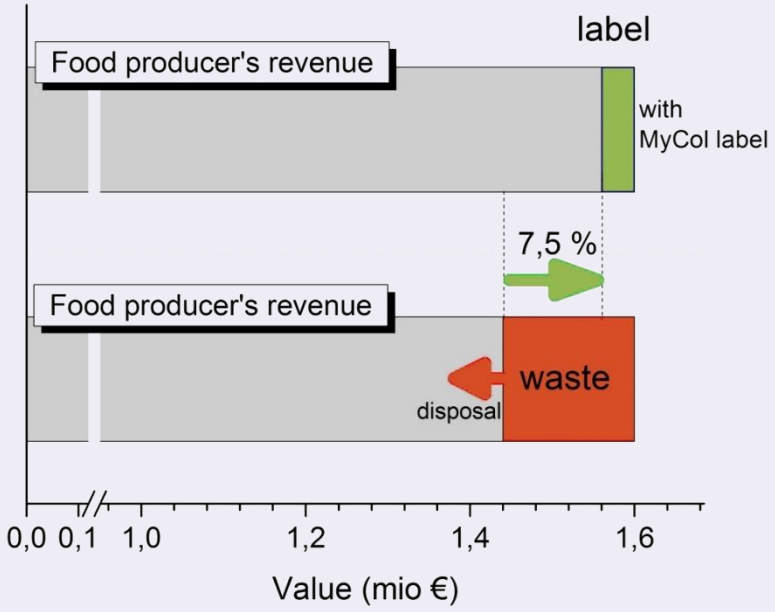
Customer value proposition

Typical SME food producer in Slovenia



Benefits to the producer

- Negligible investment
- Less food waste
- Increased revenue
- Trust and loyalty of consumers

Benefits to the community

- Healthier & better food
- Less money spend for food
- Higher level of sustainability

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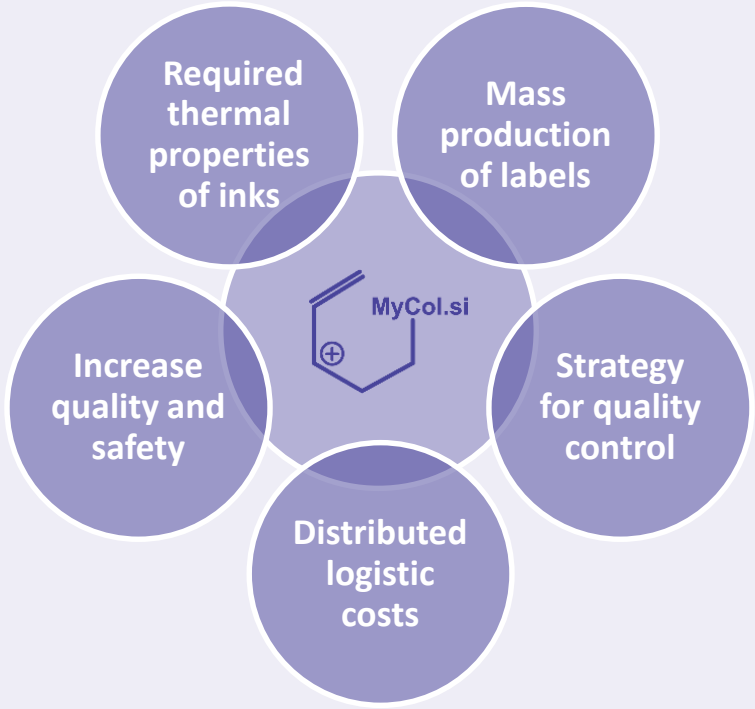
JTBD and competitive advantages



- Researchers from materials science, technology, environmental science, and industrial prototyping
- Continuous introduction of new knowledges from frontiers of science
- Different know-how → trade secrets

Colouring invisible changes

Dr Marta Klanjšek Gunde
materials science
R&D

Dr Kristina Bašnec
chemical
technology

Dr Maša Žveglič
graphic
technology
design

Dr Nadja Železnik
certification,
accounting
ecology &
management

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Thank you for your attention!

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