Potentiel de la technologie d'impression jet d'encre pour l'agroalimentaire

Assemblée Générale 2021 – Cluster Food & Nutrition

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Yoshinori Domae
Director of Technology & Innovation

Yoshinori.Domae@hefr.ch

+41 26 429 69 03

Dr. Gioele Balestra
Director of Research & Education

Gioele.Balestra@hefr.ch

+41 76 419 09 88

iPrint

inspire.
challenge.
create.

Haute école d'ingénierie et d'architecture Fribourg
Hochschule für Technik und Architektur Freiburg

Hes·so
Haute Ecole Spécialisée
de Suisse occidentale
Fachhochschule Westschweiz
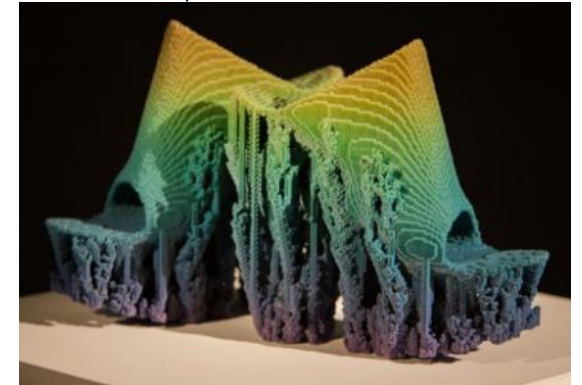University of Applied Sciences and Arts
Western Switzerland

Inkjet
Printing is

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- **Non-contact process**
  - ✓ Print on objects
  - ✓ Print out 2.5D - 3D objects
  - → *Shift from print to produce*

- **On demand**
  - ✓ Change design whenever you want
  - → *Mass customization*

- **High definition and productive**
  - ✓ High speed (e.g. 100 m/min)
  - ✓ Photographic quality
  - → *High-value production of the future*

https://www.indiamart.com/proddetail/stone-wall-panel-tile-17798996488.html

https://www.photoxels.com/stratasys-multi-material-3d-printing-technology-fashion-hashtagtechstyle-exhibition/

https://www.sneakerschampion.top/ProductDetail.aspx?iid=10809969&pr=26.99

Inkjet advantages

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1. Size of deposited material: from μm to mm

FDM

https://www.heise.de/make/artikel/FDM-3D-Drucker-im-Vergleich-2545710.html

Inkjet

40x40x25cm

https://japan.mimaki.com/special/3d_print/gallery.html

2. Multi-material & Grayscale jetting

Paper — In-line inkjet head

Transfer belt
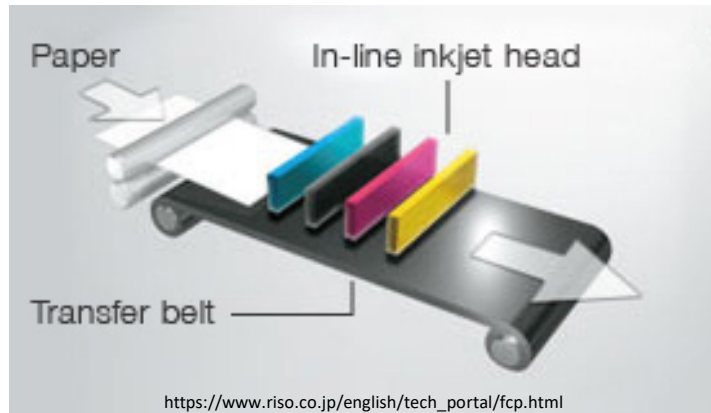
https://www.riso.co.jp/english/tech_portal/fcp.html

Typical multi-pulse waveforms in a greyscale printhead

Single pulse - small drop

Double pulse - medium drop

Triple pulse - large drop

https://www.fujifilm.com/id/en/business/manufacturing-process/inkjet-technology/printheads
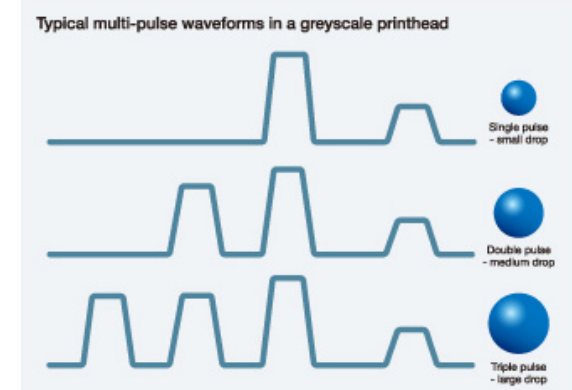
Food
related
applications

Packaging for food

1. Identification
2. Decoration and Texturization
3. Functionalization
4. Direct printed packaging

Food

1. Identification
2. Decoration and Texturization
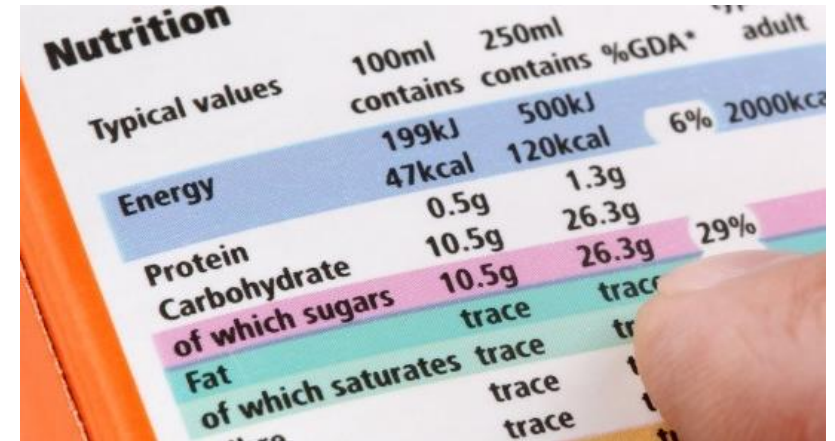3. Functionalization
4. Digital food manufacturing

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Example of applications

Packaging for food

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1. Identification

https://www.refrigeratedfrozenfood.com/articles/87856-thermal-inkjet-printer-for-non-porous-packaging-materials

https://www.lancastergeneralhealth.org/health-hub-home/2019/september/total-carbohydrates-vs-net-carbs-what-should-people-with-diabetes-count

2. Decoration and Texturization

https://www.kurz-graphics.com/cold-transfer/?L=0

https://www.cmaimaging.com/clear

Example of applications

Packaging for food

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3. Functionalization

[Hydrophobic-oleophobic]
To "repel" more functionally and sensibly

90

http://www.fujiko.jp/en/product/repellent.html

https://www.packagingdigest.com/smart-packaging/breakthrough-printed-electronics

4. Direct printed packaging

https://www.3dnatives.com/en/3d-printed-flowerbomb-perfume-set-140120216/

FIGURE 1 – Guava submitted to different treatments: (A) Control – without coating; (B) Coating 1; (C) Coating 2; (D) Coating 3; (E) Coating 4; after stored for 12 days.

Example of applications

Food

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1. Identification

https://kodyka.com/industries/food-marking-coding/

https://www.syte.ai/blog/visual-ai/12-image-recognition-apps-to-try-this-weekend/

2. Decoration and Texturization

https://www.thewindupspace.com/best-edible-printer-for-edible-ink-and-paper/

https://www.crushpixel.com/stock-photo/self-service-display-with-many-720061.html

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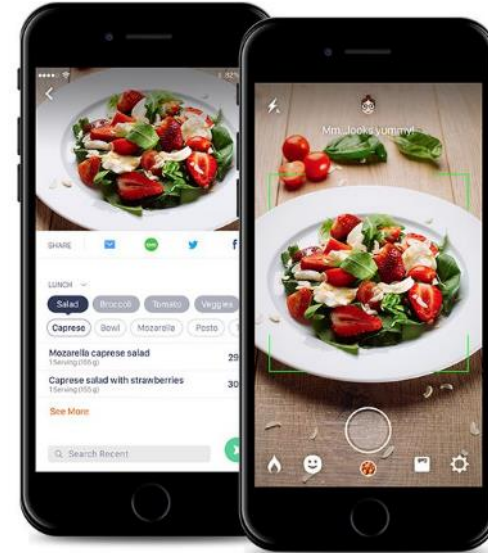
Example of applications

Food

3. Functionalization

4. Digital food manufacturing

https://www.ebuyer.com/blog/2014/11/3d-printed-food/

https://www.finedininglovers.fr/article/steak-3D

About iPrint

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Position of iPrint

HES-SO : University of Applied Sciences and Arts Western Switzerland

- HES-SO Fribourg
  - HEIA-FR – R&D Institutes & Competence Centers
    - ChemTech : Chemical Technology Institute
    - ENERGY : Institute for Applied Research in Energy Systems
    - HumanTech : Technology for Human Wellbeing Institute
    - iCoSys : Institute of Complex Systems
    - iRAP : Institute of applied research in plastics
    - iSIS : Institute of intelligent and secure systems
    - iTEC : Institute for Built Environment Technologies
    - SeSi : Sustainable engineering systems institute
    - TRANSFORM : Institute of architecture(heritage, construction and uses)
    - iPrint : Printing Institute & Competence Center
    - ROSAS Center: Safety Engineering focusing of Robust and Safe Embedded Systems
    - Plastic Innovation Competence Center: Smart Materials & Integrated Plastic Solutions

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What is iPrint?

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- Founded in 2013
- Institute and Competence center for Inkjet technology
- 7 professors, 30 scientific staff, 2 technicians, 2 administrative staff
- 1'500 m² space, 24 labs with multiple home-built research printers

What are our objectives?

Education
Educate specialists in inkjet-related core competences
with a highly interdisciplinary understanding

Innovative technologies
Develop new technologies enabling the
revolution in tomorrow's digital production

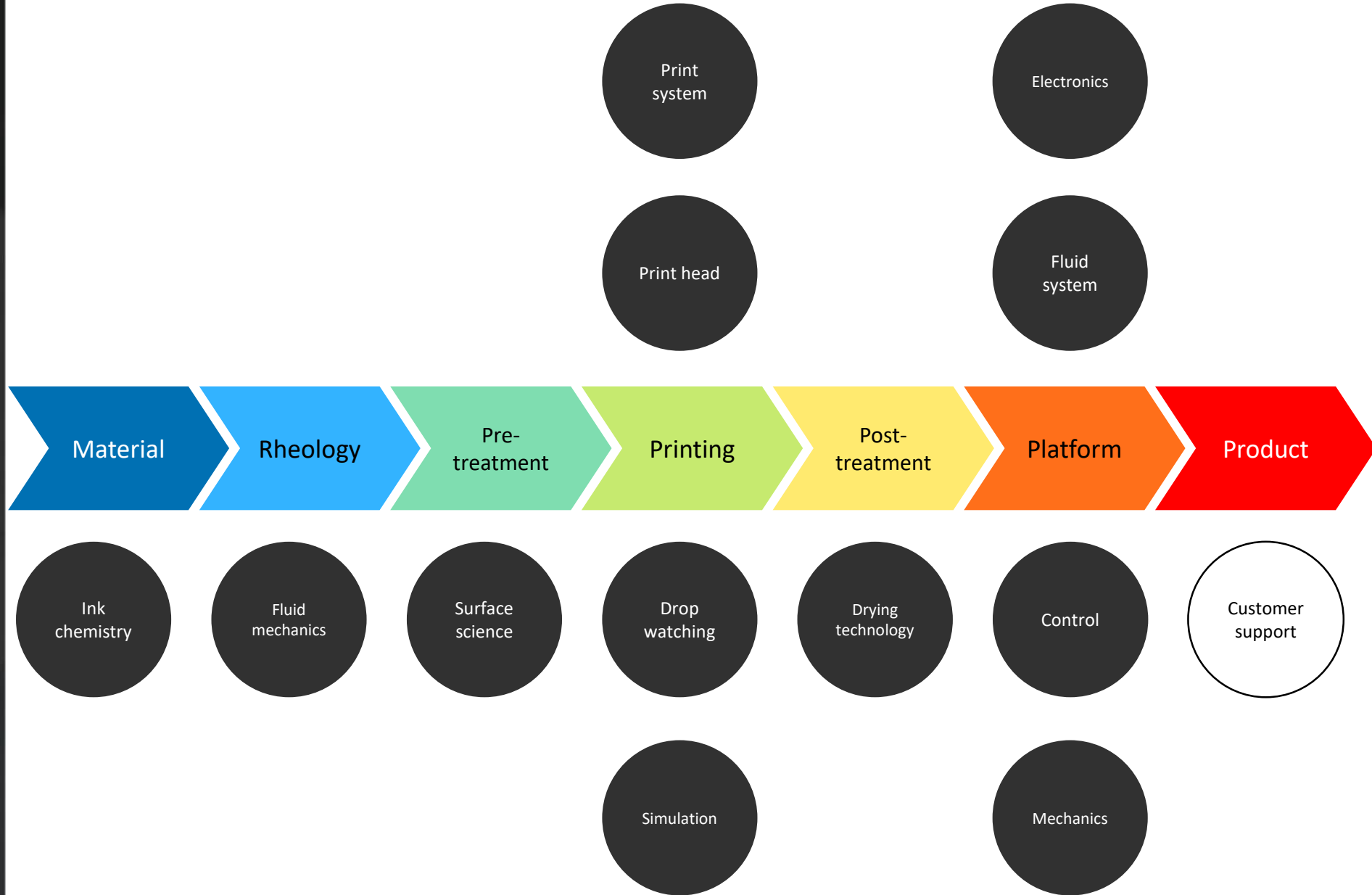Material → Inkjet-based digital production → Product
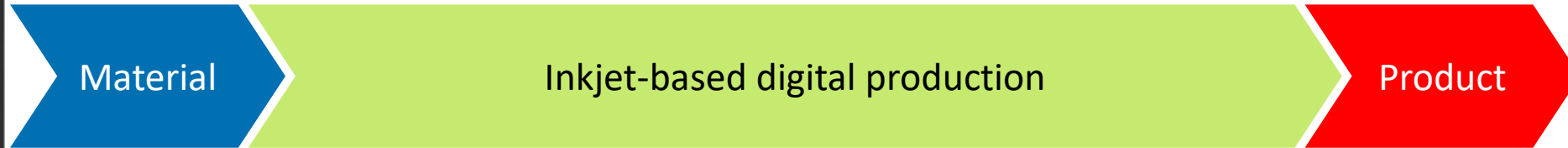
Applied research
Develop and optimize inkjet-based
digital printing processes

Technology transfer
Foster the technology transfer for
digital printing processes

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What are our Core Competences?

Print system

Electronics

Print head

Fluid system

| Material | Rheology | Pre-treatment | Printing | Post-treatment | Platform | Product |

Ink chemistry

Fluid mechanics

Surface science

Drop watching

Drying technology

Control

Customer support

Simulation

Mechanics

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inspire. challenge. create.

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