

Challenges and Opportunities for Emerging Technologies in the Food Industry

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Drivers of change in food processing



Consumer needs

- Healthy & Tasty
- Convenience
- Tailored functionality
- Personalised products

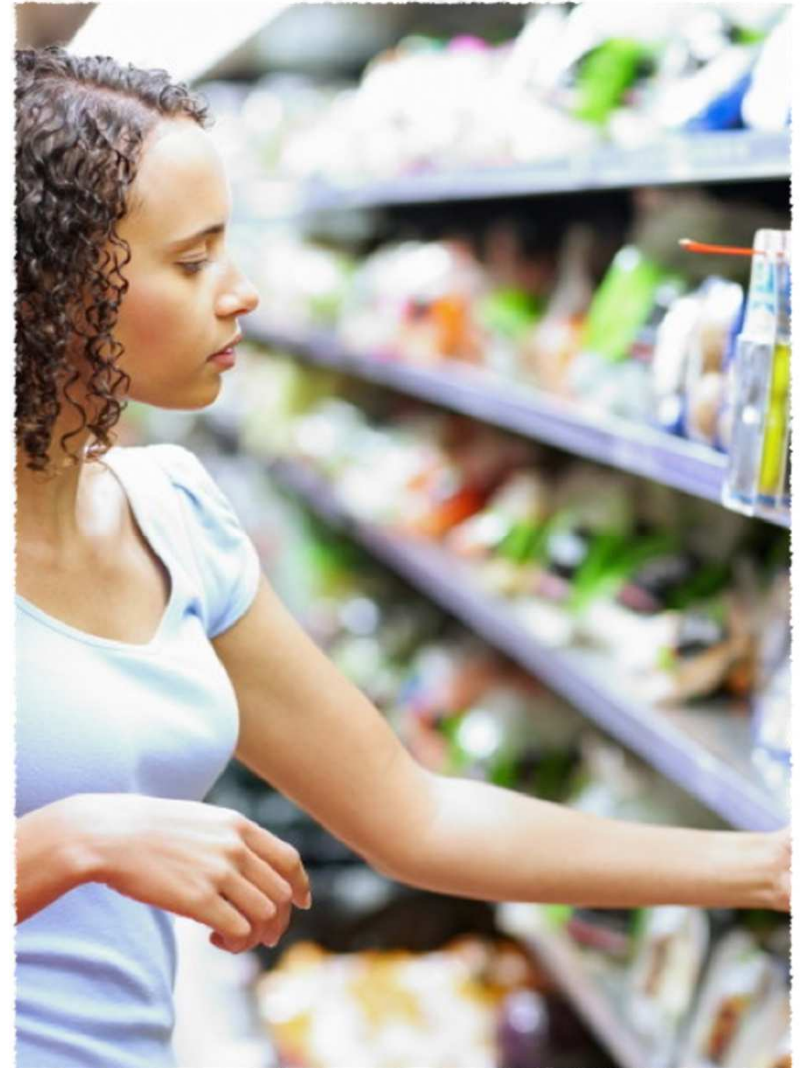


Sustainability/ economy

- Resource Effective Processes (Water, Energy, Waste)
- Shorter and tailored processes
- Circular economy
- Shorter food chains

Emerging Technologies

- Non-thermal processing
- Structure processing
- Functional Powders
- Smart combinations of processing and packaging
- Sustainability



Non-thermal processing



- High pressure processing
- Membrane processing
- UV-light
- Pulsed Electric Fields
- Ultrasounds
- Plasma

Add value – Fresh

Extend Shelf-life

Improve functionality

Keep nutritional value

Three bottles of Naked brand 100% juice smoothies are shown side-by-side. The first bottle on the left is 'berry blast' with a red cap and red juice. The middle bottle is 'green machine' with a green cap and green juice. The third bottle on the right is 'mighty mango' with an orange cap and orange juice. Each bottle has a label with the 'Naked' logo, a list of ingredients, and the text '100% JUICE SMOOTHIE' and 'NO SUGAR ADDED'. The labels also feature small images of the fruits used in each smoothie.



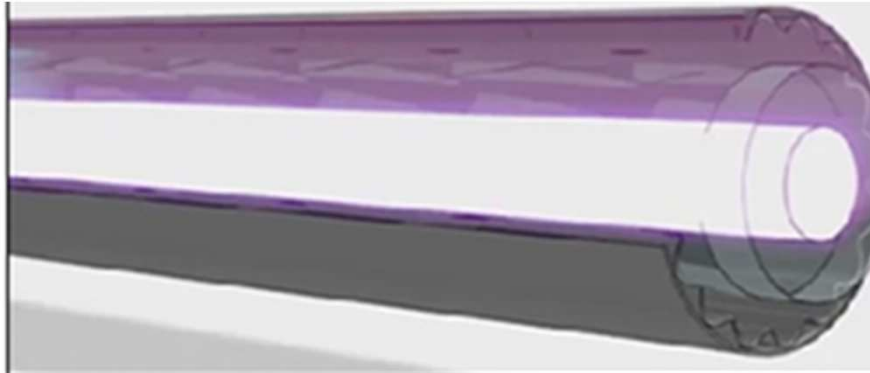
Can safe raw milk be produced?

The Sydney Morning Herald

'Cold-pressed raw milk' method wins regulatory approval



UV light



SurePure photopurification

Wavelength 254nm

- Reduces the microbial load of milk but not inactivate enzymes
- The process increases shelf life of dairy products by at least 30%
- Improve texture and aroma in cheddar cheese
- Used in South Africa approved in India and US for juices

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Opinion

Safety of UV-treated milk as a novel food pursuant to Regulation (EC) No 258/97

EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA)

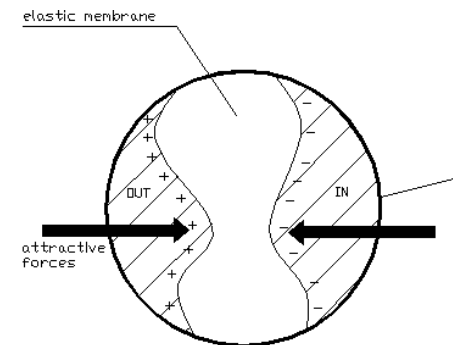
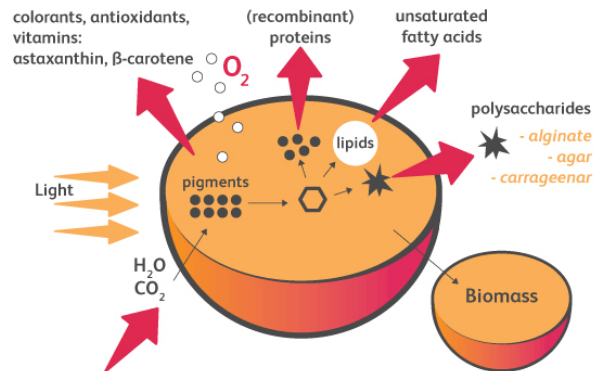
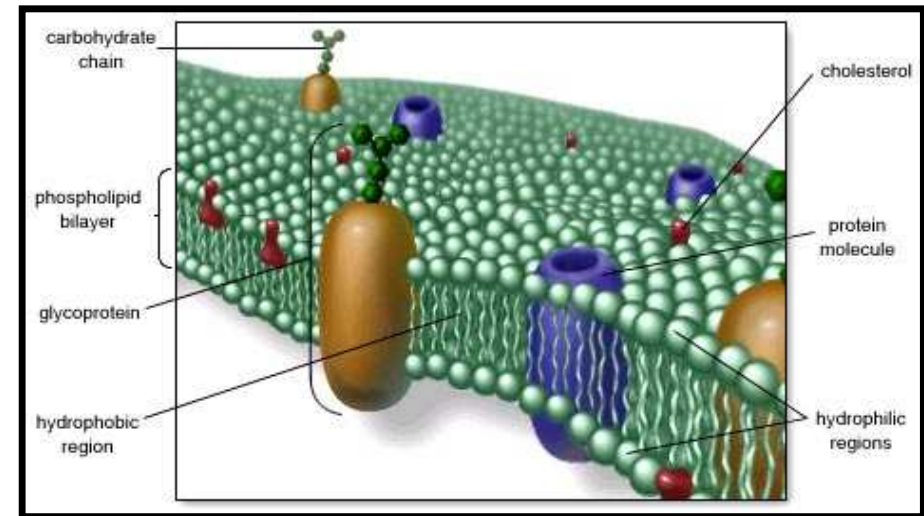
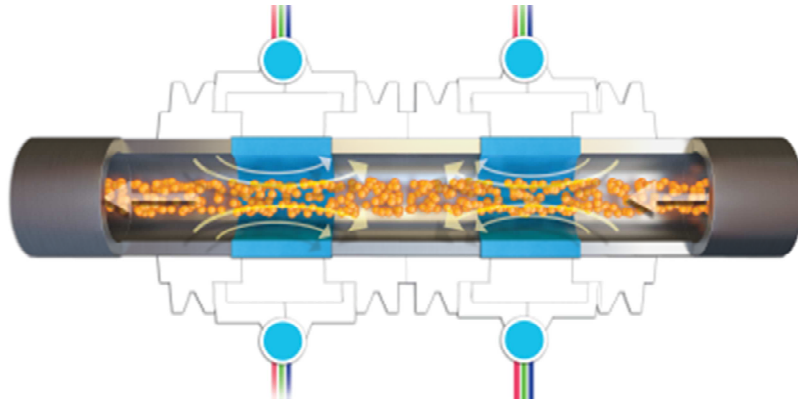
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Membrane filtration



Pulsed Electric Fields



- Electric field induces charges
- Compression and deformation
- Pore formation occurs
- Loss of physiological control systems leading to cell death

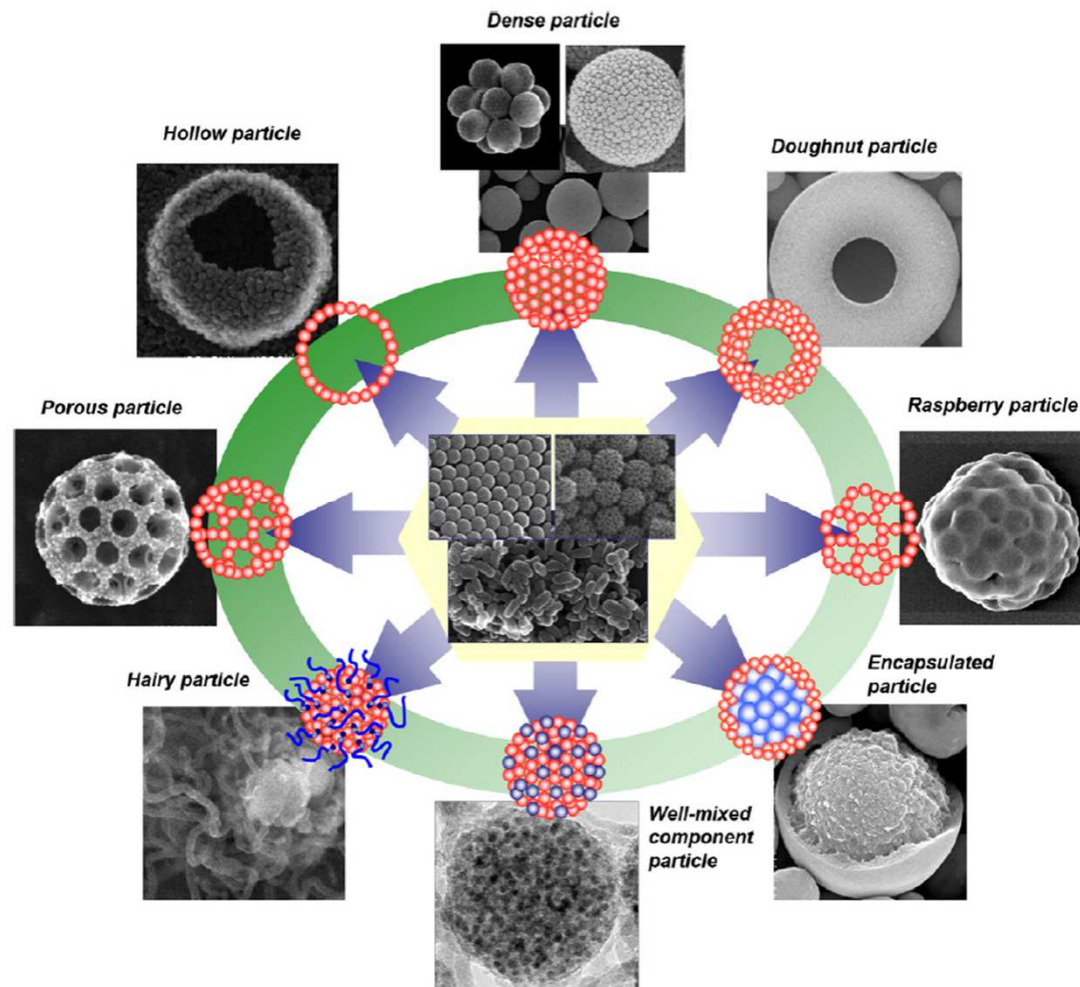
Cutting Improvement



Challenges of non-thermal

- ◆ Tangible advantages clearly demonstrated
- ◆ Consumer acceptance
- ◆ Better fit in existing lines
- ◆ Multidisciplinary studies needed
- ◆ Need of demonstration sites

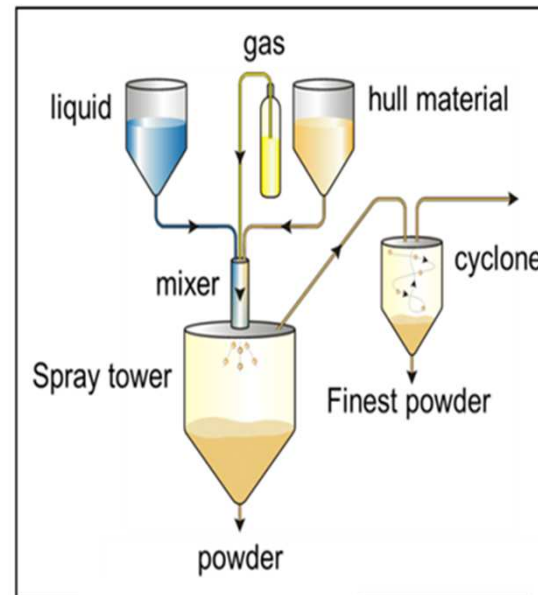
Functionalised powders



Encapsulation
Coating
Agglomeration

Innovative drying technologies

Innovative spray technologies like, supercritical CO₂ spraying, electrospraying



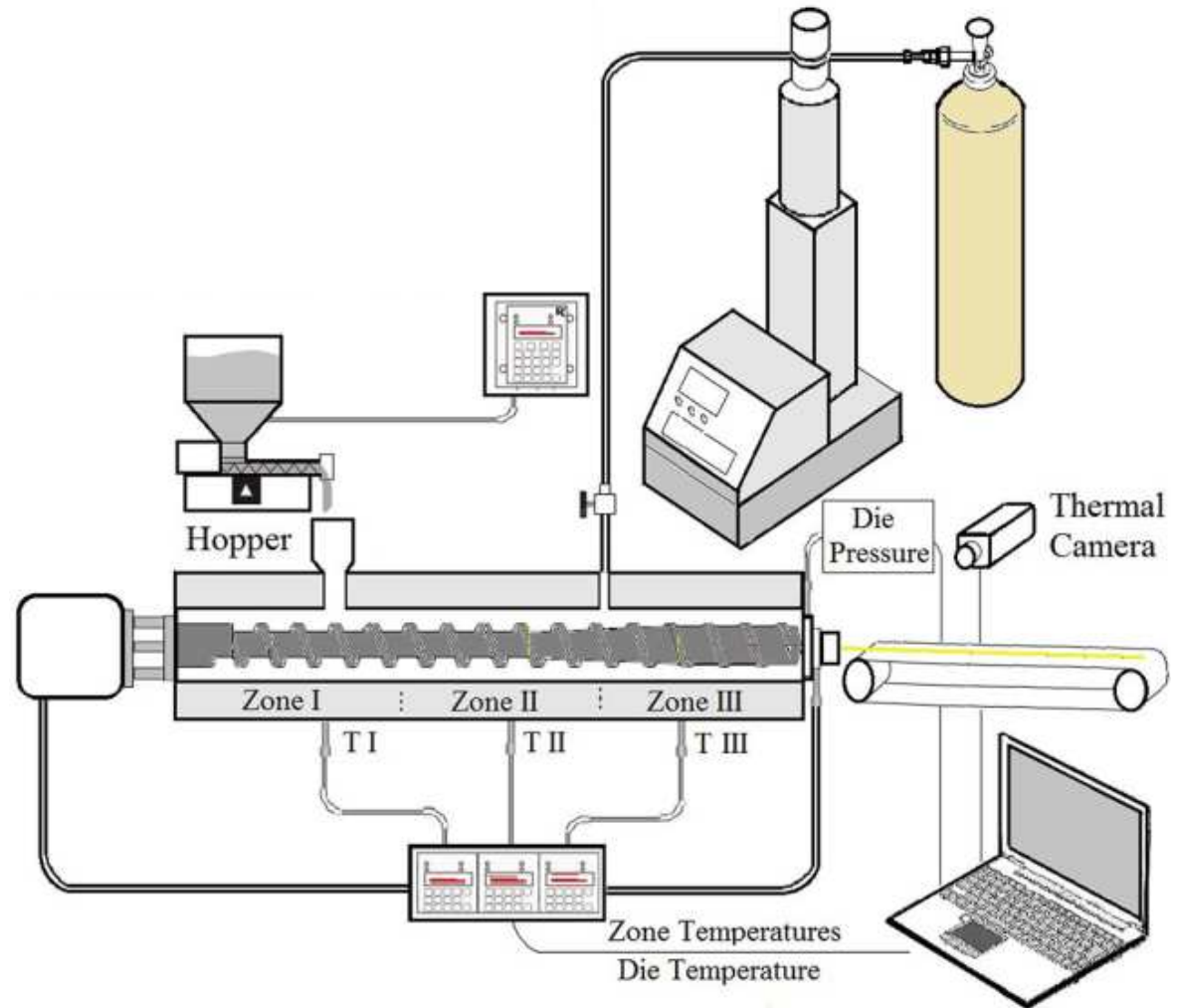
Improved solubility
High bioavailability
Control release

Structure Processing

Supercritical CO₂ extrusion

Snacks from byproducts?

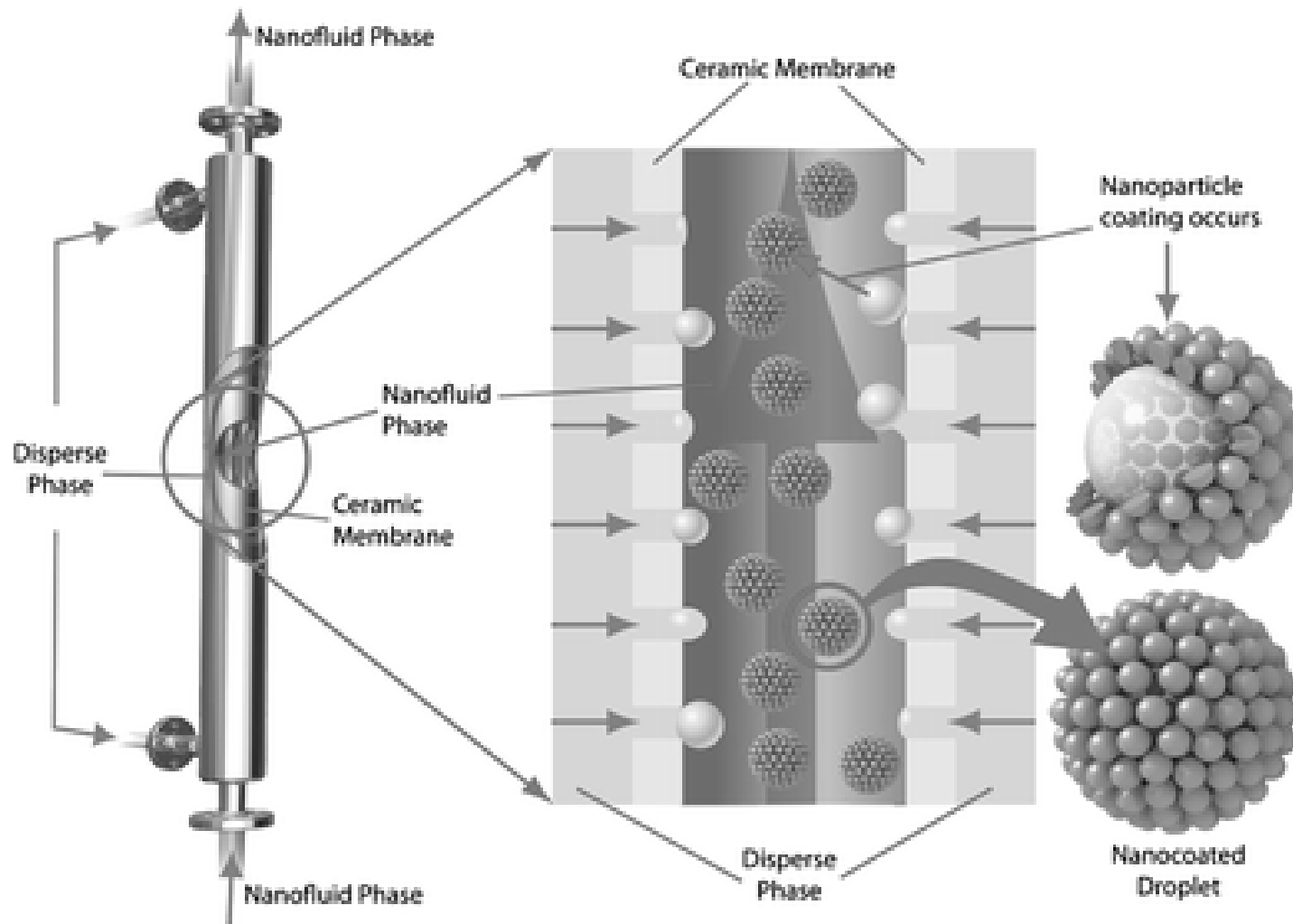
Foaming properties



3D printing

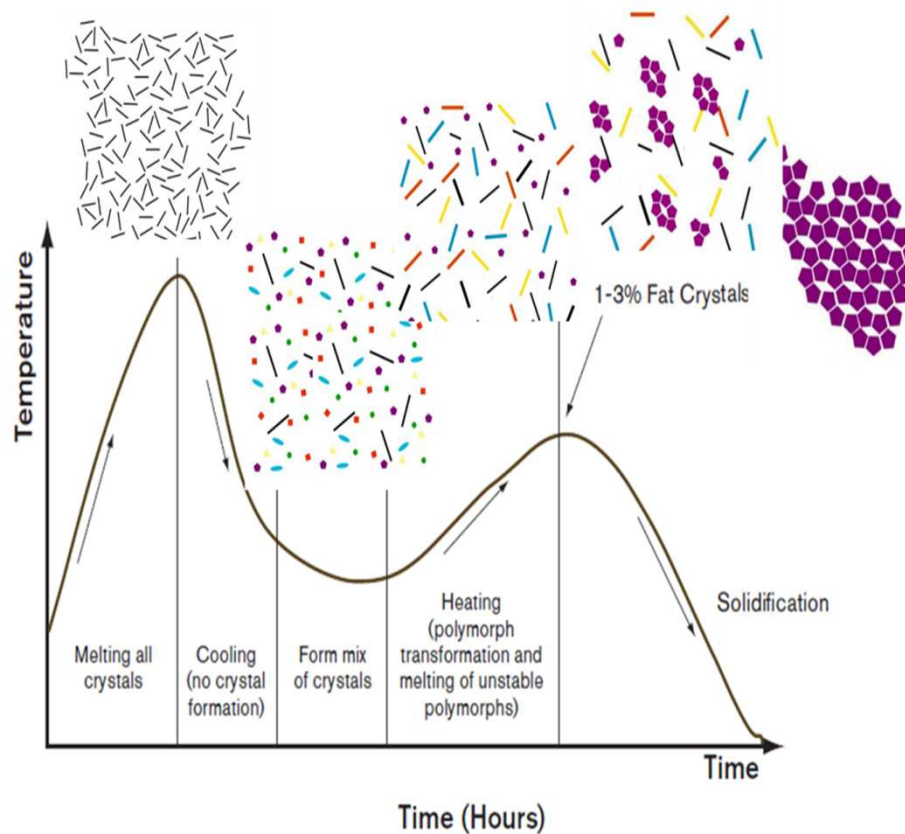


Membrane emulsification



Modification of lipids & induced crystallisation

Effects on butter and possibility to develop innovative and healthy spreads



Smart combinations of processing and packaging



Right and Simple



Sustainability

- ◆ Improving processing efficiency
- ◆ Extraction/fractionation (Circular economy)
- ◆ Process intensification
- ◆ small scale processing units



Improving process efficiency

- ✦ In a non optimised process there is a potential to reduce energy consumption by 50%
- ✦ In a optimised process there is a potential of reduce further 10% the energy consumption



Holistic
approaches

Technology
shift

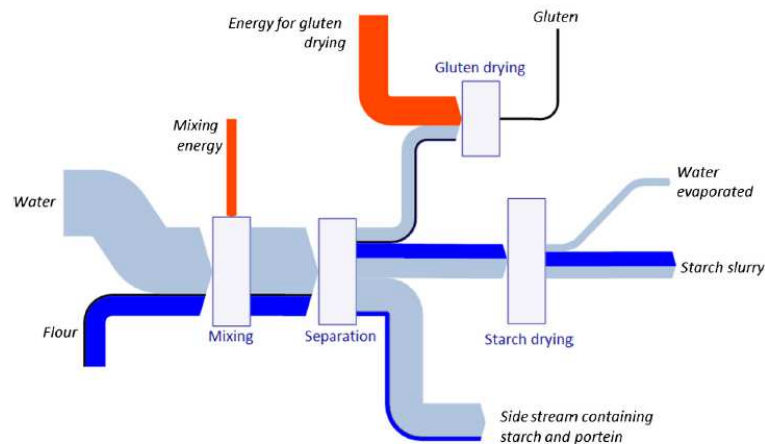
Reuse
of energy

Optimise the
process

Process Intensification

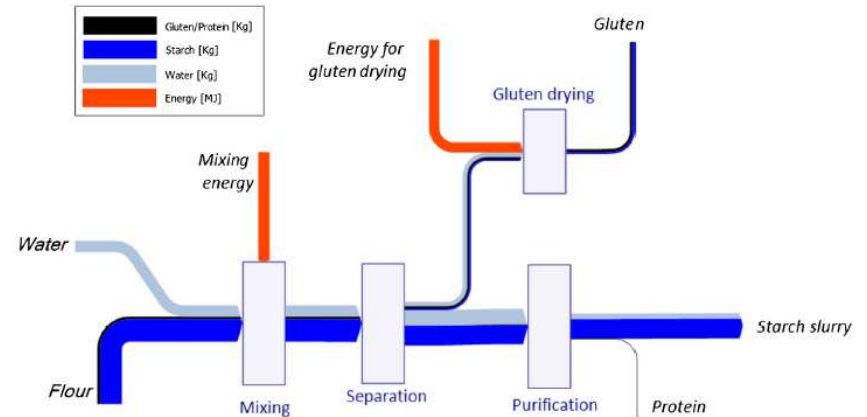
Separation of wheat flour in starch and gluten

Conventional process



vrs

Concentrated process



Van der Goot et al. (2016) Concepts for further sustainable production of foods, journal of food engineering

GRACIAS
ARIGATO
SHUKURIA
THANK
YOU
BOLZIN MERCI

BIYAN
SHUKRIA

TASHAKKUR ATU
SUKSAMA
MEHRBANI
GRAZIE
HAKE
KOMASP-SUMIDA
GOZAMASHTA
EFGHABISTO
JUSPAXAR
DANKSCHEEN
YACHANTAY
PALES
YINZAI