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Escola Superior de Biotecnologia

Modern Packaging in Support of Quality and Safety of Foods and Consumer Demand

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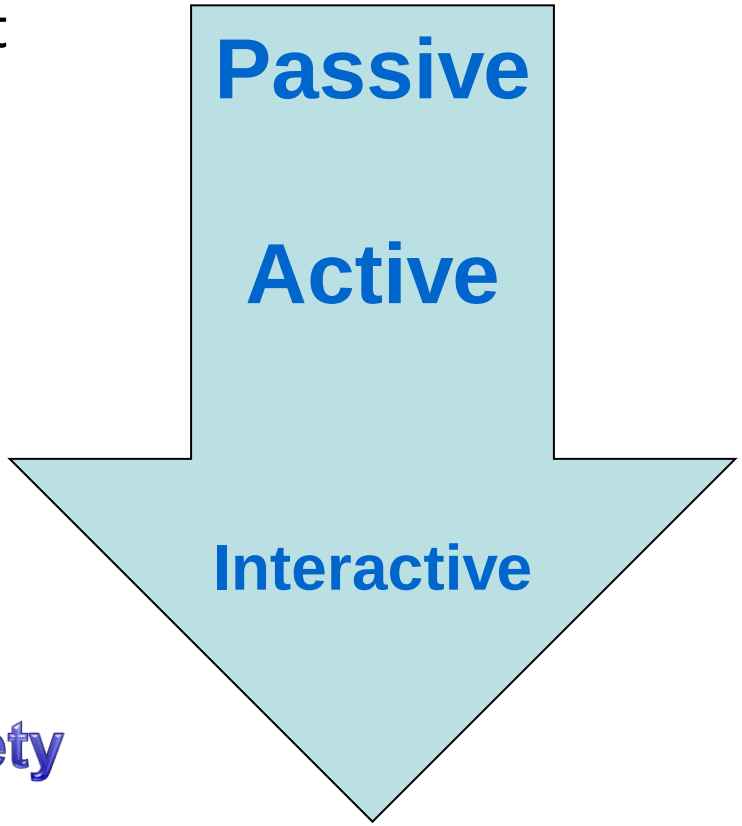
Role of packaging today

- Protection and containment
- Preservation
- Service & use
- Information



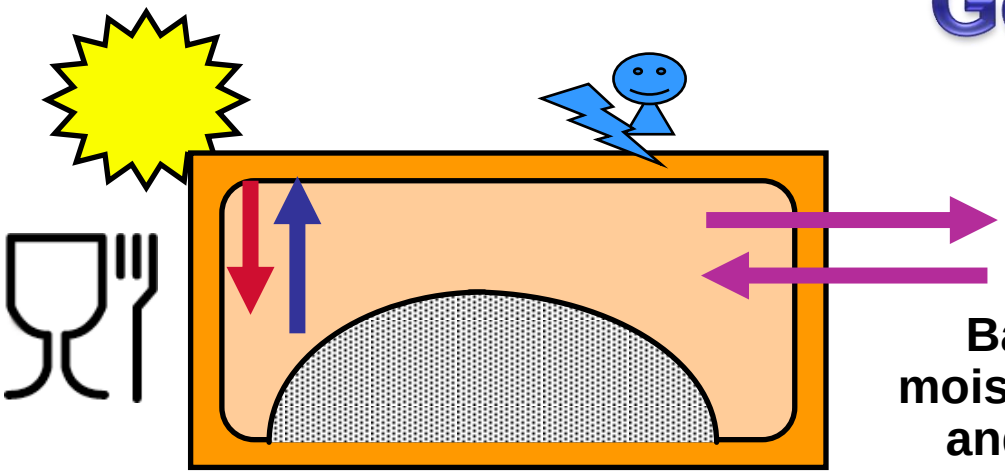
Improve quality and safety
Convenience
Hectic lifestyles & environment

Role of packaging today

- Protection and containment
  - Physic-mechanical protection
  - Loss of integrity (tamper-evident)

Role of packaging today

- Preservation
  - Food quality
    - Chemical, texture, nutritional
    - Organoleptic and consumer expectations
  - Food safety
    - Physical, chemical and biological hazards



Goal: to optimize the shelf-life

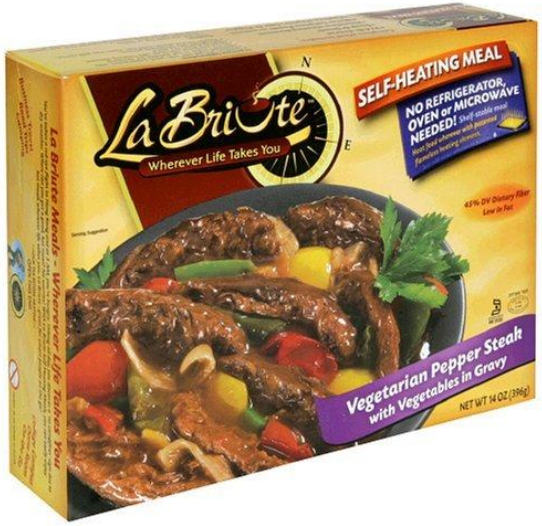
Barrier to moisture, gases and aromas

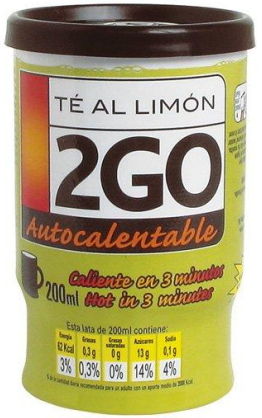
Role of packaging today

- Packaging service and use
  - Easy-open/resealing

Role of packaging today

- Packaging service and use
  - Cook-in (microwaveable)
  - Self heat and chill the contents





Role of packaging today

- Packaging service and use
  - Consumption occasion
  - Use of the product

Emergency meals

Role of packaging today

- Information
  - Targeted the consumer
    - Legal requirements
    - Information about the product, storage, and preparation
  - Targeted the distribution chain
    - Stocks management
    - Identification and traceability

Role of packaging today

- New concepts of packaging to influence shelf-life
  - Passive: passive barrier to separate the product from surroundings
  - Active: interacts directly with the product and/or surrounding atmosphere to improve a factor (nutritional, quality or safety)
  - Intelligent: senses a situation and provides information such as quality, environment, location, safety, etc.

Active packaging - examples

- Water absorbers
  - To remove liquid squeezed or leaking from fresh products such as meat, poultry and fruit
    - Unpleasant, source of major consumer complaints
    - Medium for microbiological growth
    - Odour generating
    - Controlled by pulp or polymers

Maxwell-Chase Polymeric Absorbers

Active packaging - examples

- Moisture/relative humidity control

MiniPax®Sorbent
silica gel packets are formed of heat sealed Tyvek® spun bonded polyolefin

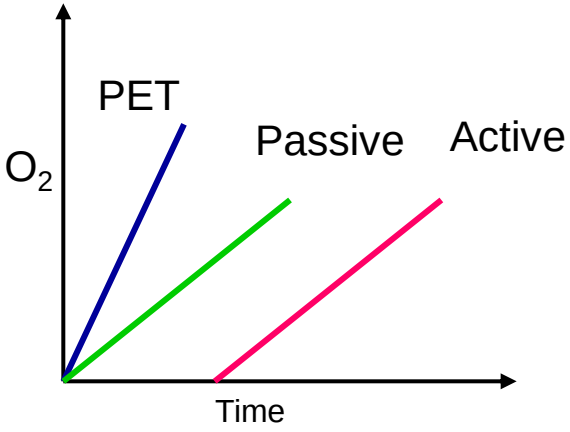
How 2-way humidity control works
Responds and adjust to the outside temperature and climate by either adding or removing humidity—as needed—to maintain a predetermined level of relative humidity (RH) inside of packages and containers

Active packaging - examples

- Oxygen absorbers
  - To remove oxygen and retard oxidative reactions
  - As sachets in headspace or labels
  - Incorporated into package materials (liners, package material)

Active packaging - examples

- Oxygen absorbers
  - Incorporated into package materials (liners, package material)
    - OS2000® (Cryovac)
    - OSP® (Chevron)
    - BindOx (Amcor)
    - Amosorb (BP Amoco)
    - Shelf plus® (Ciba S.C)
    - ZerO2® (CSIRO)



Active packaging - examples

- Ethylene removal and adsorption
  - Physical absorption on active surfaces: Activated carbon, Zeolite
  - Chemical removal with permanganate

Active packaging - examples

- Sulfur dioxide emitters
  - Grapage (J.K.Enterprises)
  - UvasQuality (IMAL, Ltd)
  - UVASYS (Grapetek Pty)

Active packaging - examples

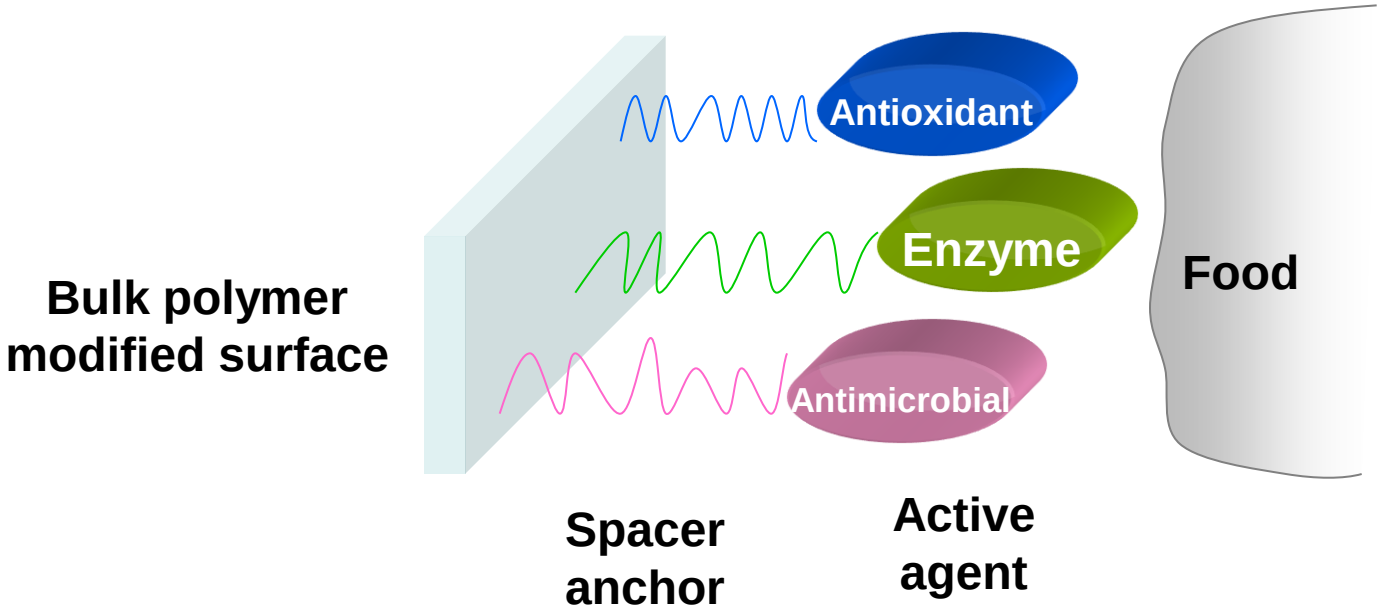
- Flavouring releasing
  - Unistraw (Unistraw Int. Ltd)

Active packaging - examples

- Antimicrobial or countermicrobial
  - Objective is to reduce the rate of growth of spoilage and/or pathogenic microorganisms in the contained food and thus extend the shelf life
  - Technologies under study
    - Silver ion
    - Allyl isothiocyanate
    - Chlorine dioxide
    - Antibiotics
    - Organic acids
    - Ethyl alcohol
    - Natural spices and essential oils

Active packaging - examples

- Immobilized functional food ingredients (bio-active packaging)



Role of packaging today

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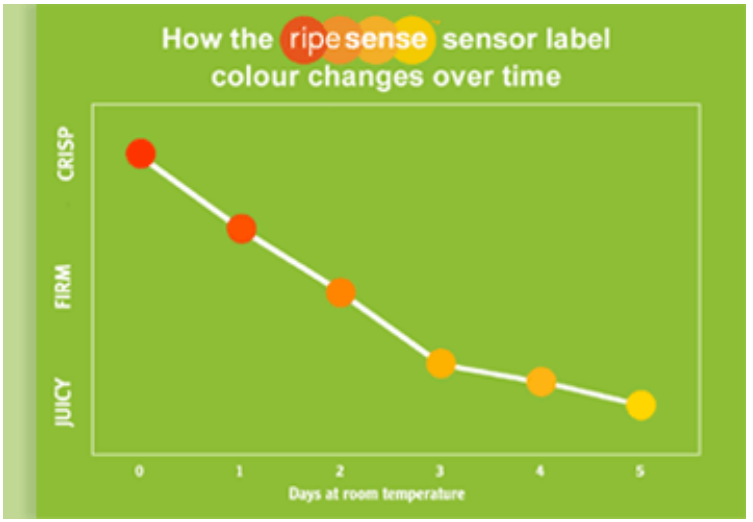
Intelligent packaging - examples

- Information on
  - Ripeness
  - Headspace gas
  - Thermal history
  - Authenticity
  - Package integrity
  - Location

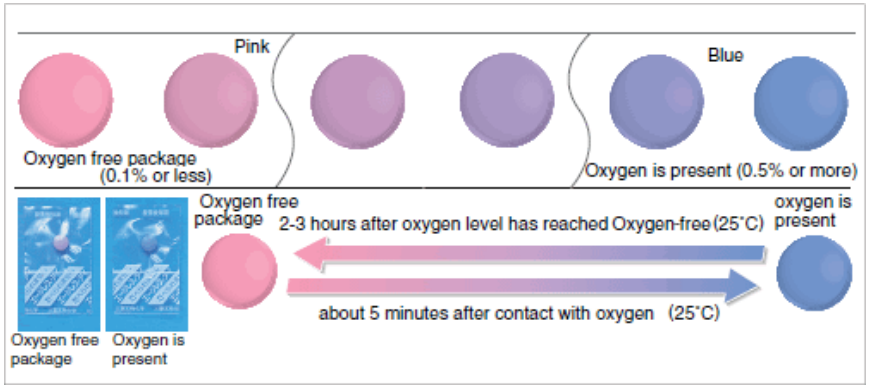
Intelligent packaging - examples

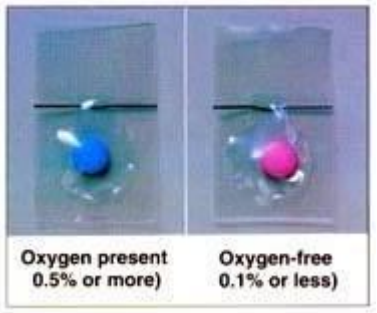
- Gas sensing indicators
  - Maturation indication for pears (Ripesense, Ltd)



Intelligent packaging - examples

- Gas sensing indicators
  - Oxygen sensing (Ageless Eye, Mitsubish)





Intelligent packaging - examples

- Thermal history
  - LifeLinesFresh-Check:
    - Based on polymerization reaction
  - 3M Monitor Mark:
    - Based on dye diffusion

Intelligent packaging - examples

- Thermal history
  - Vitsab®TTI (Cox Technologies)
    - Based on enzymatic lipase color change

Vitsab® Flight Label

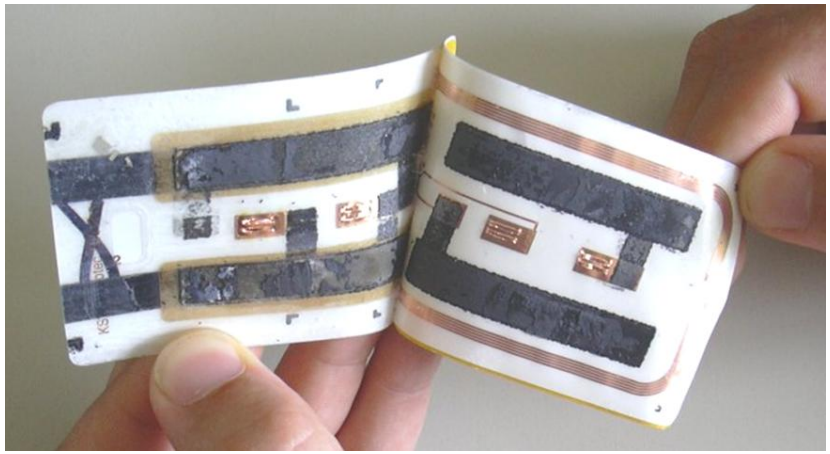
Intelligent packaging - examples

- Integrity
  - Uniquely-numbered holograms

- Authenticity
  - DNA embedment in ink

Intelligent packaging - examples

- Traceability
  - RFID
    - Also combining TTI



Conclusion

- Role of packaging across the global value chain will
  - continue to expand and
  - rise in importance

  - as consumers become
  - more demanding and
  - the supply chain needs are uncovered