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

Fátima Poças

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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
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)
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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, Mitsubishi)
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
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