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Multifunctional and nanoreinforced polymers for food packaging

J-M Lagarón, Novel Materials and Nanotechnology Group, IATA-CSIC, Spain

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- Structural factors governing barrier properties
- Novel polymers and blends
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PART 1 NANOFILLERS FOR PLASTICS IN FOOD PACKAGING

Multifunctional nanoclays for food contact applications

J-M Lagarón, and M-A Busolo, Novel Materials and Nanotechnology Group, IATA-CSIC, Spain

- Introduction
- Antimicrobial nanoclays
- Oxygen-scavenging nanoclays
- Future trends
- References

Hydrotalcites in nanobiocomposites

U Costantino and M Nocchetti, University of Perugia and G Gorrasi and L Tammaro, University of Salerno, Italy

- Introduction
- Hydrotalcite-like compounds: basic chemistry (HTlc)
- Organically modified biocompatible (HTlc)
- Nanocomposites of biodegradable polymeric matrices and modified hydrotalcites
- Conclusions and future trends
- References

Cellulose nanofillers for food packaging

R T Olsson, L Fogelström, Royal Institute of Technology, Sweden, M Martínez-Sanz, Novel Materials and Nanotechnology Group, IATA-CSIC, Spain and M Henriksson, Royal Institute of Technology, Sweden and SP Technical Research Institute of Sweden, Sweden

- Introduction
- Morphological and structural characteristics of cellulose nanofillers
- Extraction and refining of cellulose nanofillers
- Mechanical properties of cellulose nanofillers
- Surface modification of cellulose nanofillers
- Preparation of cellulose reinforced nanocomposites
- Future trends and applications of cellulose nanofillers
- References

Electrospun nanofibers for food packaging applications

S Torres-Giner, Novel Materials and Nanotechnology Group, IATA-CSIC, Spain

- Electrospinning
- Functional nanofibers
- Nanoencapsulation

- Electrospinning in packaging applications
- Future trends
- References

PART 2 HIGH BARRIER PLASTICS FOR FOOD PACKAGING

Mass transport and high barrier properties of food packaging polymers

F Nilsson and M S Hedenqvist, Royal Institute of Technology, Sweden

- Introduction: the basics of mass transport
- Diffusivity
- Solubility
- What makes a barrier a barrier?
- Characterisation techniques
- References

Ethylene-norbornene copolymers and advanced single-site polyolefins

T J Dunn, Printpack Inc, USA

- Introduction
- Synthesis and molecular structure: advanced single-site polyolefins
- Macromolecular structure: advanced single-site polyolefins
- Macromolecular structure: ethylene-norbornene copolymers
- Nanocomposite preparation: advanced single-site polyolefins
- Future trends
- Sources of further information and advice
- References

Advances in polymeric materials for modified atmosphere packaging (MAP)

T K Goswami, Indian Institute of Technology, India; S. Mangaraj, CIAE, India

- Introduction
- Modified atmosphere packaging (MAP)
- Physiological factors affecting shelf life of fresh produce
- Postharvest pathology of fruit and vegetables
- Response of fresh produce to modified atmosphere packaging
- Polymeric film in application for (MAP)
- Cellulose-based plastics
- Biodegradable polymers
- Multilayer plastic films
- Gas permeation or gas transmission
- Water vapor permeability
- Packaging system in MAP
- Advanced technology for efficient MAP packaging
- Package management
- Design of modified atmosphere packaging
- Mathematical modeling of gaseous exchange in MAP system
- Current application of polymeric films for MAP of fruits and vegetables
- Future trends
- References

Nylon-MXD6 resins for food packaging

A Ammala, CSIRO Materials Science and Engineering, Australia

- Structure and general overview
- Processing
- Gas barrier properties
- Other properties
- Applications
- Nylon-MXD6 nanocomposites

- Future trends
- References

Ethylene-vinyl alcohol copolymers

A López-Rubio, Novel Materials and Nanotechnology Group, IATA-CSIC, Spain

- Introduction
- Structure and general properties of ethylene vinyl alcohol (EVOH) copolymers
- Ethylene vinyl alcohol (EVOH) versus. Aliphatic polyketones
- Processing in packaging
- Improving retorting of ethylene vinyl alcohol (EVOH)
- Nanocomposites of ethylene vinyl alcohol (EVOH) and poly(vinyl) alcohol (PVOH)
- Future trends
- References

High barrier plastics using nanoscale inorganic films

V Teixeira, J Carneiro, P Carvalho, E Silva, S Azevedo and C Batista, University of Minho, Portugal

- Introduction
- Nanotechnologies thin films for advanced food packaging
- Thin films technologies for polymer coating using vacuum processes
- Physical vapour deposition (PVD) processes
- Inorganic thin film systems
- Functional properties of diffusion barrier coated polymers
- Future trends
- References

Functional barriers against migration for food packaging

C Johansson, Karlstad University, Sweden

- Introduction
- Food safety issues related to migration
- Functional barriers
- Nanostrategies for functional barriers
- Future trends
- Sources of further information and advice
- References

PART 3 ACTIVE, BIOACTIVE AND INTELLIGENT PLASTICS

Silver-based antimicrobial polymers for food packaging

A Martínez-Abad, Novel Materials and Nanotechnology Group, IATA-CSIC, Spain

- Introduction
- Incorporation of silver into coatings and polymer matrices
- Antimicrobial silver in food packaging
- References

Incorporation of chemical antimicrobial agents into polymeric films for food packaging

B Raj, R S Matche and R S Jagadish, Central Food Technological Research Institute, India

- Introduction
- Antimicrobial agents
- Chemical antimicrobial
- Natural antimicrobial agents
- Polymers (synthetic or natural)
- Nano antimicrobial agents
- Antimicrobial films and coatings
- Antimicrobial activity

- Future perspective
- References

Natural extracts in plastic food packaging

P Suppakul, Kasetsart University, Thailand

- Introduction
- Natural plant extracts as antimicrobials and antioxidants
- Designing active plastic packaging systems from natural plant extracts
- Packaging films based on natural extracts
- Factors to consider in designing active systems
- Future trends
- Sources of further information and advice
- References

Bioactive food packaging strategies

A López-Rubio, Novel Materials and Nanotechnology Group, IATA-CSIC, Spain

- Introduction
- Definition and technologies
- Nanotechnologies
- Control release of bioactives
- Future trends
- References

PART 4 NANOTECHNOLOGY IN SUSTAINABLE PLASTICS FOR FOOD PACKAGING

Polylactic acid (PLA) nanocomposites for food packaging applications

J-M Lagaron, Novel Materials and Nanotechnology Group, IATA-CSIC, Spain

- Introduction and properties of polyactic acid (PLA)
- Nanocomposites of polyactic acid (PLA) for monolayer packaging
- Future trends
- References

Polyhydroxyalkanoates (PHAs) for food packaging

D Plackett and I Siró, Technical University of Denmark, Denmark

- Introduction
- Commercial developments
- Polyhydroxyalkanoates (PHAs) and polyhydroxyalkanoates (PHAs) nanocomposite films
- Polyhydroxyalkanoates (PHAs) foams and paper coatings
- Conclusions
- Future trends
- Sources of further information and advice
- References

Starch based polymers for food packaging

R M González and M P Villanueva, Technological Institute of Plastic (AIMPLAS), Spain

- Introduction
- Market of starch-based materials and potential applications
- Structure and properties of native and plasticized starch
- Processing in packaging
- Mechanical and barrier performance of starch-based systems
- Nanocomposites
- Future trends
- Sources of further information and advice
- References

Chitosan polysaccharide in food packaging applications

P Fernandez-Saiz, Novel Materials and Nanotechnology Group, IATA-CSIC, Spain

- Introduction
- Structure and properties
- Processing in packaging
- Antimicrobial chitosan
- Barrier performance
- Nanocomposites
- Future trends
- References

Carragenan polysaccharides for food packaging

M D Sanchez-Garcia Novel Materials and Nanotechnology Group, IATA-CSIC, Spain

- Introduction
- Structure and properties of carrageenan
- Processing in packaging
- Barrier performance
- Nanocomposites
- References

Protein-based resins for packaging

A A Vicente, M A Cerqueira and L Hilliou, University of Minho, Portugal and C Rocha, University of Porto, Portugal

- Materials (sources, extractin, structure and properties)
- Structure and properties
- Materials processing
- Packaging materials characterization (barrier performance, mechanical properties)
- Applications
- Future trends
- References

Wheat gluten (WG)-based materials for food packaging

H Angellier-Coussy, V Guillard, C Guillaume and N Gontard, University of Montpellier II, France

- Introduction
- Preparation of wheat gluten-based materials
- Mechanical and barrier properties of wheat gluten based materials
- Wheat gluten-based nanocomposites
- Example of integrated approach for the packaging of fresh fruits and vegetables
- Future trends
- References

Safety and regulatory aspects of plastics as food packaging materials

B Raj and R S Matche, Central Food Technological Research Institute, India

- Introduction
- Indirect food additives
- Nanotechnology in food contact materials
- Migration of additives
- Indian standards for overall migration (IS: 9845-1998)
- US-food and drug administration (USFDA), code of federal regulations (CFR)
- European commission directives on plastic containers for foods
- Specific migration of toxic additives
- Recent problems in specific migration
- Future trends
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