KNOW-HOW IN ADHESIVES AND ADHESION PROCESSES

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RESUMEN

The Adhesion and Adhesives Laboratory of the University of Alicante has a broad experience in the formulation, modification and rheology of adhesives (contact adhesives, hot melts, thermosets, PSAs). The main activities of the laboratory deal with the understanding and the improvement of adhesion processes in several research and industrial fields, mainly the footwear, toys, natural stone, surgery practice and packaging.



INTRODUCCIÓN

The Adhesion and Adhesives Laboratory of the University of Alicante has a great experience in dealing with the understanding and the improvement of adhesion processes in several research and industrial fields, mainly the footwear, toys, natural stone, surgery practice and packaging. Further, the laboratory has a broad experience in the formulation, modification and rheology of adhesives (contact adhesives, hot melts, thermosets, PSAs).

DESCRIPCIÓN TÉCNICA

RESEARCH FIELDS OF INTEREST

The Adhesion and Adhesives Laboratory of the University of Alicante is working on following research fields which could be of interest for industry:

- Surface treatment of polymers and rubbers in the footwear industry.
- Surface modifications of plastics and polymers in the toy industry.
- Metallization of plastics.
- Rheological properties of adhesives containing fillers.
- Painting of poliolefins.
- Development of acrylic adhesives for medical applications.
- Development of thermoset coatings for marble and natural stones.
- Synthesis of thermoplastic polyurethane adhesives for footwear.
- Surface modification to mechanical reinforcement and improved adhesion of leathers.
- EVA based hot melt adhesives for packaging.
- Tackifiers in PSA adhesives.

EQUIPMENT

The Adhesion and Adhesives Laboratory of the University of Alicante owns the following equipment:

- Brookfield viscometer DV-I
- Thermocell device for Brookfield viscosity determination in hot melt adhesives.
- Stress-controlled rheometer Bohlin CS50.
- Physica Rheolab MC 100 rheometer.
- Dynamic Mechanical Thermal Analyzer (DMTA) Rheometric Scientific DMTA Mk III
- Differential Scanning Calorimeter (DSC): TA Q100 with low temperature accessory.
- Contact angle measurements:
- Ramé - Hart 100 goniometer
- DGD Fast 60 GBX goniometer
- Dynamic Contact Angle Analyzer Cahn DCA-322
- Fourier Transformed infra-red spectrometer TENSOR 27.
- Fourier Transformed infra-red spectrometer VECTOR 22 (Bruker).
- Infra-red microscope Bruker IR scope II
- Texture Analyzer TA-XT2i .
- Hot melt adhesive dispenser Slautterback-LS- 10H
- Shore A Hardness Durotech BS 550.
- Ring and Ball softening point (ASTM, E 28-92).
- Drop point cell Mettler FP83HT.
- Adhesion and stress-strain measurements in materials
- Universal test machine Adamel- L'Homargy DY32
- Universal test machine Instron 4411
- Wheathering chamber DYCOMETAL K-100
- Corona discharge unit Tantec HV9.
- Low pressure RF gas plasma Plasmod.
- UV-Visible spectrophotometer Pye-Unicam Helios.

COURSES

The Adhesion and Adhesives Laboratory of the University of Alicante offers 3 kind of courses:

1. Specific training of Companies (individual, small groups). The training involves both theoretical and practical activities.

2. General courses on Adhesion and/or Adhesives for Public and Private Research Centres.

3. Master/Specific long-term courses for Professionals, Researchers, and Graduate Students. Every two years a course on "Adhesion Phenomena in adhesive joints" is taught. The duration of the course is 235 hours.

PROJECTS UNDER DEVELOPMENT

- Improvement of the Adhesion of SBR, SBS, EVA by Low Pressure Gas Plasma Surface Treatment.
- Surface Properties vs Rheological Properties of Adhesives: Influence in the Adhesion and Performance of Adhesives in Packaging and Footwear.
- Use of Marble Processing Residues as Filler in Unsaturated Polyester Resins for Floor Tiles Reinforcement.
- Treatment of Natural Stones with Epoxy Resins to Improve their Impact and Flexion Resistance.
- Surface Treatment with Corona Discharge of Elastomeric Polyolefins to Improve their Adhesion to Paints.
- Development of a Water-Based Surface Treatment for Rubber Soling Materials.
- Protection of Beida Cream Limestone Through Organic and Inorganic Coatings.
- Addition of Natural Ultramicronized Calcium Carbonate to Hot Melt Adhesives.
- New Acrylic Formulations to Seal Cornea.
- Metallization of Plastics.
- Contact Angle Measurement in Painted Metallic Panels.
- Preparation and Improvement of the Paint Adhesion to Elastomeric Polyolefins Prepared by Rotation Molding.
- Development of a Water-Based Leather Treatment for Footwear.
- Consulting and Technical Assistance in Adhesives Joints in Ceramic, Building, Wood, Textile, Marble, and Toy Industries.

COLLABORATION WITH COMPANIES/ORGANISATIONS

3M (Madrid).

ARIZONA CHEMICALS (France).

BAYER AG (Leverkusen, Germany).

BERMÁRMOL S.A. (Novelda, Alicante).

CIBA GEIGY (Barcelona).

COMPOSAN ADHESIVOS (Alicante)

DEGUSSA-HULS (Hanau, Germany).

ELF (Madrid).

HB FULLER CORPORATION – (St Paul, Minnesota, EEUU)

USA HENKEL (Barcelona).

HERCULES BV (Rijswick, The Netherlands).

HOOKER (Barcelona).

IBERCERAS (Madrid).

INSTITUTO OFTALMOLÓGICO DE ALICANTE (Alicante).

LA UNIÓN RESINERA (Madrid).

LEVANTINA INDUSTRIAS ASOCIADAS, S.A. (Novelda, Alicante).

LOCTITE (Madrid).

MERQUINSA (Montmeló, Barcelona).

MINILAND (Ibi, Alicante)

PPG IBÉRICA (Valencia)

REPSOL QUÍMICA (Madrid).

S.A. REVERTÉ (Bellvei, Tarragona).

SOLVAY (Barcelona).

TENAX (Verona, Italy).

TOLSA (Madrid)

VIATECNIA, S.L (Alicante).

WACKER AG (Germany).

VENTAJAS Y ASPECTOS INNOVADORES

A high theoretical and applied knowledge is available and it allows to improve and to develop new adhesives and adhesion processes which could be of interest for several industry sectors.

ESTADO ACTUAL

Adhesives and adhesion processes are tested at laboratory scale. Experience and facilities are available to make the scale up to industrial applications.

APLICACIONES DE LA OFERTA

The technology and know-how could be of interest to several industries: footwear, toys, plastic, natural stone, surgery practice, packaging, automotive, aeronautics, wood, etc.

COLABORACIÓN BUSCADA

The Adhesion and Adhesives Laboratory of the University of Alicante is interested in:

- Establishing projects to develop, formulation, modification and rheology of adhesives.

- Carrying out analyses, tests, technical reviews about rheology of adhesives, surface treatments, etc.

DERECHOS DE PROPIEDAD INTELECTUAL

The Adhesion and Adhesives Laboratory of the University of Alicante owns the know-how. Some adhesion processes developed have been patented.

PERFIL DEL GRUPO DE INVESTIGACIÓN

The Adhesion and Adhesives Laboratory of the University of Alicante was founded in January 1990 and the main specific aspects in which the laboratory have experience are the following:

1. Surface modification of polymers and rubbers to improve their adhesion properties. More precisely, the following surface treatments are or have been studied:

a) Chemical treatments (chlorination, cyclization of rubbers)

b) Corona discharge.

c) UV and UV/ozone surface treatment.

d) Low pressure gas RF plasma.

2 Modifications of adhesives:

a. Addition of fillers (fumed silicas, calcium carbonate, silicates).

b. Addition of tackifiers (rosin resins, cumarone-indene resins, terpene resins, hydrocarbon resins).

c. Addition of adhesion promoters (silanes, carboxylic acids, organic anhydrides).

3. Thermoset adhesives:

a. Cyanoacrylates for surgery practice (mainly eye surgery).

b. Unsaturated polyester resins as hard coatings for natural stones.

c. Epoxy resins as reinforcing coating of marble.

SECTORES DE APLICACIÓN (3)

Footwear and Textile
Materials and Nanotechnology
Stone and Marble