Thermalism and Science

Universidade de Vigo

Training

Research

Transference of knowledge
Thermalism and Science

Universidade de Vigo

Training

Research

Peloids
Caracterization

Transference of knowledge
Thermalism and Science

Universidade de Vigo

Campus da Auga

Training

Research
CAMPUS DO MAR
KNOWLEDGE IN DEPTH
Staff: 46

- 10 Professors
- 6 Associated PhD
- 8 Researchers (PhD)
- 3 Lab technicians
- 19 Researchers (Doctoral students)

Director: Dr. Legido
Research fields and lines

- Materials: Nanoparticles
- Environment: Remote-sensing in marine environment
- Biophysics: Bacterial growth
- Simulation: Molecular simulation
- Thermalism: Peloids and Swimming pools disinfection
Training

Training courses

MÁSTER EN TERMALISMO E BALNEOTERAPIA

Ciencia e Tecnoloxía
### Training courses

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Perspectivas actuais do termalismo</td>
<td>Estética saúde e ocio</td>
<td>Novas formas de benestar</td>
<td>Termalismo: innovación e calidad</td>
<td>Termalismo: augas e barros</td>
<td>Termalismo: presente e futuro</td>
<td>Termalismo: ciencia e técnica</td>
<td>Termalismo: peloides termais</td>
<td>Termalismo: innovación en centros termales</td>
<td>Termalismo no espacio transfronteiriço galicia-norte de portugal</td>
<td>Termalismo e química: homenaxe a A. Casares</td>
<td>Termalismo: innovación en produtos termais</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>2002</td>
<td>2003</td>
<td>2004</td>
<td>2005</td>
<td>2006</td>
<td>2007</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-----------------------------------</td>
<td>-----------------------------------</td>
<td>-----------------------------------</td>
<td>-----------------------------------</td>
<td>-----------------------------------</td>
<td>-----------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perspectivas actuales del termalismo</td>
<td>Estética salud e ocio</td>
<td>Novas formas de benestar</td>
<td>Termalismo: innovación e calidad</td>
<td>Termalismo: augas e barros</td>
<td>Termalismo: presente e futuro</td>
<td>Termalismo ciencia e técnica</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Año</td>
<td>Tema</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>Termalismo: peloides termais</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>Termalismo: innovación en centros termales.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>Termalismo: análise dos centros termais en galicia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>Termalismo no espacio transfronterizao galicia-norte de portugal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>Termalismo e química: homenaxea a A. Casares</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>Termalismo: innovación en productos termais</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MÁSTER EN TERMAKLISMO E BALNEOTERAPIA

Ciencia e Tecnoloxía
Research

Peloids

Definition

Classification

Uses

Characterization

Chemical

Mineralogical

Microbiological

Physical
**Peloids**

**Definition**

Peloids are thermal therapeutic agents used in spas and thermal centers for different illness and prevention. Peloids consist in the mixture of a mineral water, comprising the seawater and that from salted lakes, with organic or inorganic matters, which are the result of geologic or biological, or at the same time geologic and biological processes, used in therapy in form of poultices or baths.

**Classification**

<table>
<thead>
<tr>
<th>Type</th>
<th>Composition</th>
<th>Water</th>
<th>Temperature</th>
<th>Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal-Mediterranean</td>
<td>Mineral, Sulfurous</td>
<td>Hot, NaCl</td>
<td>Hyperthermal</td>
<td>In-situ</td>
</tr>
<tr>
<td>Sea water</td>
<td>Mineral, Sulfurous</td>
<td>Sea water</td>
<td>Hyperthermal</td>
<td>In-situ</td>
</tr>
<tr>
<td>Plant (mineral soils)</td>
<td>Organic and Mineral</td>
<td>Sulfurous</td>
<td>Hyperthermal</td>
<td>In-situ</td>
</tr>
<tr>
<td>Biological</td>
<td>Organic and Sulfurous</td>
<td>Sulfurous</td>
<td>Hyperthermal</td>
<td>In-situ</td>
</tr>
<tr>
<td>Algae</td>
<td>Organic and Sulfurous</td>
<td>Sulfurous</td>
<td>Hyperthermal</td>
<td>In-situ</td>
</tr>
<tr>
<td>Optic</td>
<td>Organic and Sulfurous</td>
<td>Sea water</td>
<td>Hyperthermal</td>
<td>In-situ</td>
</tr>
</tbody>
</table>

**Uses**

- **Thermotherapy**
- **Paleotherapy**
  - Air or Thermal covering
  - Muds or Peloids
  - Heat
  - Skin

**Characterization**

- Poultices
- Thin layer
Definition

Peloids are thermal therapeutic agents used in spas and thermal centers for different illness and prevention. Peloids consist in the mixture of a mineral water, comprising the seawater and that from salted lakes, with organic or inorganic matters, which are the result of geologic or biological, or at the same time geologic and biological processes, used in therapy in form of poultices or baths.
Clasification

Spas and classification. Peloids comprising the organic or inorganic biological, or at the used in therapy in

<table>
<thead>
<tr>
<th>Type</th>
<th>Composition</th>
<th>Water</th>
<th>Temperature</th>
<th>Maturation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal Mud</td>
<td>Mineral</td>
<td>Sulfurous Na chloride</td>
<td>Hiper-meso-hipothermal</td>
<td>In situ Tank</td>
</tr>
<tr>
<td>Sea mud (liman)</td>
<td>Mineral</td>
<td>Sea water salted lake</td>
<td>Hipothermal</td>
<td>In situ</td>
</tr>
<tr>
<td>Peat (tourbe, torbe, moor)</td>
<td>Organic and Mineral</td>
<td>Alcaline Sulfurous Sea water</td>
<td>Hiper-meso-hipothermal</td>
<td>Open air Tank</td>
</tr>
<tr>
<td>Biogea (mojases, barogines, mufe)</td>
<td>Organic</td>
<td>Sulfurous</td>
<td>Hipothermal</td>
<td>In situ</td>
</tr>
<tr>
<td>Sapropeleli</td>
<td>Organic and Mineral</td>
<td>Alcaline Sulfurous</td>
<td>Hipothermal</td>
<td>In situ</td>
</tr>
<tr>
<td>Gytta</td>
<td>Organic and Mineral</td>
<td>Sea water</td>
<td>Hipothermal</td>
<td>In situ</td>
</tr>
</tbody>
</table>
## International Classification of Peloids (ISHM, 1949)

<table>
<thead>
<tr>
<th>Type</th>
<th>Composition</th>
<th>Water</th>
<th>Temperature</th>
<th>Maturation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal Mud</td>
<td>Mineral</td>
<td>Sulfurous Na chloride</td>
<td>Hiper- meso-hipothermal</td>
<td>In situ Tank</td>
</tr>
<tr>
<td>(boue, mud, fango, schlamm, fanghi)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sea mud</td>
<td>Mineral</td>
<td>Sea water Salted lake</td>
<td>Hipothermal</td>
<td>In situ</td>
</tr>
<tr>
<td>(liman)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peat</td>
<td>Organic and Mineral</td>
<td>Alcaline Sulfurous Sea water</td>
<td>Hiper- meso-hipothermal</td>
<td>Open air Tank</td>
</tr>
<tr>
<td>(tourbe, torbe, moor)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bioglea</td>
<td>Organic</td>
<td>Sulfurous</td>
<td>Hipothermal</td>
<td>In situ</td>
</tr>
<tr>
<td>(mousses, barégines, maffe)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sapropelli</td>
<td>Organic and Mineral</td>
<td>Alcaline Sulfurous</td>
<td>Hipothermal</td>
<td>In situ</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gyttja</td>
<td>Organic and Mineral</td>
<td>Sea water</td>
<td>Hipothermal</td>
<td>In situ</td>
</tr>
</tbody>
</table>
Spas and classification. Peloids comprising the organic or inorganic geological, or at the used in therapy in

**Classification**

<table>
<thead>
<tr>
<th>International Classification of Peloids (ISHM, 1949)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
</tr>
<tr>
<td>Thermal Mud</td>
</tr>
<tr>
<td>(boux, mud, fango, schlamm, fanghi)</td>
</tr>
<tr>
<td>Sea mud</td>
</tr>
<tr>
<td>(liman)</td>
</tr>
<tr>
<td>Peat</td>
</tr>
<tr>
<td>(tourbe, torbe,</td>
</tr>
<tr>
<td>mor)</td>
</tr>
<tr>
<td>Biogea</td>
</tr>
<tr>
<td>(mousses, barogines, mufs)</td>
</tr>
<tr>
<td>Sapopelli</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Gyttja</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Uses

Thermotherapy

Poultices

Pelotherapy

Air or Thermal covering

Muds or Peloids

Skin

What for?

Thin layer
What for?
Locomotor system
Rheumatology

Arthropathies, Joint degenerative diseases
algias: arthritis, arthrosis, cervical pain, ...
Fibromyalgia
Osteoporosis

Dermatology
Skin care

Psoriasis
Dermatitis
Acne

Sports Medicine: rehabilitation

Others
Research

Peloids

Definition

Classification

Uses

Characterization

Chemical

Mineralogical

Microbiological

Physical
Caracterization

Chemical  Mineralogical  Microbiological  Physical

Thermophysics  Viscelasticity
Chemical

Gas chromatography

X-ray diffraction
Mineralogical
Microbiological
Physical Thermophysics

(Thermoltherapy)

Specific heat
Thermal conductivity

Viscoelasticity

(Application)

Density
Viscosity
Kinetics
Thermophysics

(Thermotherapy)

Specific heat

Thermal conductivity
Specific heat
Specific heat

cp / J kg⁻¹ K⁻¹ vs. % Water / % Agua
Thermal conductivity
Thermal conductivity

\( \frac{\lambda}{W \cdot m^{-1} \cdot K^{-1}} \)

\% Water

\% Agua
Viscoelasticity

(Application)

Density
Viscosity

Kinetics
Physical Thermophysics

(Thermotherapy)

Specific heat
Thermal conductivity

Viscoelasticity

(Application)

Density
Viscosity
Kinetics
Research

Peloids

Definition

Classification

Uses

Characterization

Chemical

Mineralogical

Microbiological

Physical
Training

MÁSTER EN TERMAISMO E BALNEOTERAPIA

Research

Peloids

Characterization

Transference of knowledge

Start up company

Reports and contracts

BiD Projects

CVIA

National

International
Transference of knowledge

Start up company
Building a new company

Peloides Termales

New job opportunities
Emergence of new business models

R+D Projects
CCAA
National
International

Reports and contracts
Start up company

Building a new company

Peloides Termales

New job opportunities
Emergence of new business models
Reports and contracts
Hesperia Isla de La Toja

Guitiriz Hotel Balneario & Golf Club

Talaso Atlántico

caldaria Hoteles y Balnearios

Porto-Muiños Las Verduras del Mar
R+D Projects

CCAA

National

International
R+D Projects

CCAA

National
INCITE (XUNTA)

Peloids maturation
National International
INNPACTO
ALGACLAY PROJECT:
Clays, mineral waters and microalgae for skin diseases
National International
SUDOE: TERMARED
European Thermal Spa network
Transference of knowledge

Start up company
- Building a new company
- New job opportunities
- Emergence of new business models

Reports and contracts

R+D Projects
- CCAI
- National
- International
Training

MÁSTER EN TERMALES Y BALNEOTERAPIA

Research

Peloids

Characterization

Transference of knowledge

Start up company

Reports and contracts

B+D Projects

National

International
Thermalism and Science

Universidade de Vigo

Training

Research

Transference of knowledge
Thank you very much for your attention!!
Thermalism and Science

Universidad de Vigo

Training

Research

Transference of knowledge