in.mat-Lab
Consulting & Laboratory Services

INNOVATIVE INSULATING & INORGANIC MATERIALS LABORATORY

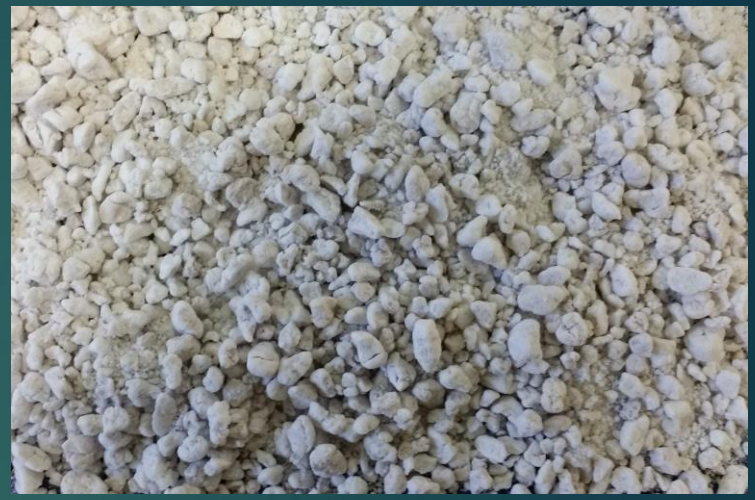
www.in-mat-lab.eu

Perlite Institute
Associate member

in.mat-Lab – Definition & Services

- **In**novative, **In**sulating and **In**organic **Mat**erials **Lab**oratory
  - Mine-to-Market and Market-to-Mine solutions (specialized on Industrial Minerals such as Perlite, Vermiculite, Bentonite, Pozzolans, etc.)
  - Value-to-Client Analyses (VTCA) targeting the added value to the final product

- **Services**
  - Testing & Analyses
  - Technical support
  - Consulting
  - Research & Development
  - Professional Education



Testing & Analysis (1)

Perlite & Vermiculite characterization/evaluation:

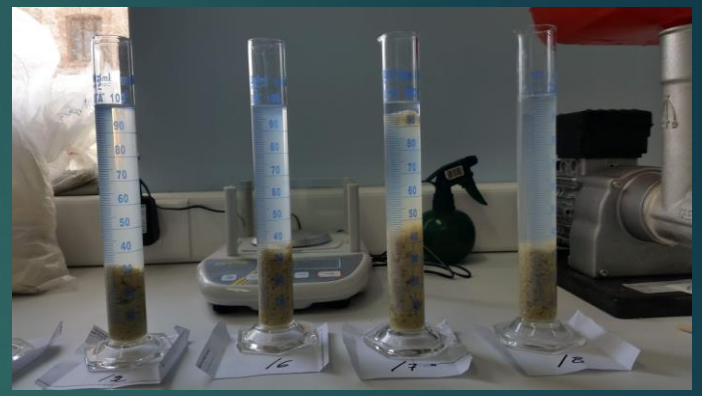
- A state-of-the-art laboratory with ***multi-task lab expansion furnaces (conventional grades and ultra-fine grades modules)*** providing targeted data based on specific analytical schemes.

- Advanced services such as **Value-To-Client analysis** based on the sample's characteristics, energy consumptions calculations per stage and final use in comparison to defined commercial qualities or other competitive ones

Testing & Analysis (2)

Bentonite:

- **Raw**: Evaluation in terms of their basic properties, such as montmorillonite content (MBA method), required soda for activation etc.
- **Activated**: Characterization in terms of their swelling index, rheological properties (according to API), thermal stability (based on MBA method).



Pozzolans:

- Investigation of the influence of the product's physical properties on the pozzolanic activity and final ready-mix properties in collaboration with accredited laboratories (organizing, supervising and evaluating the lab tests).

Technical support- Consulting

- Evaluate the effects that a change in supplier, formulation, or manufacturing process may have on final products.
- Employ assigned specific evaluation schemes to provide precise Value-to-Client Analysis (VTCA)
- Application-based mine mapping of industrial mineral deposits
- Act as a third party in case of a conflict.
- Design of processes and products with tailor-made properties
- Provide sustainable solutions, including waste & by-product management

In.mat-Lab ⇒ Efficiency (savings in resources & time)

The path to Profitability – Quantification of Industrial Minerals' "Value"

The value of an industrial mineral in most of the cases is strongly dependent on the final application.

A simple specification may not describe the behavior/suitability of the raw material

⇒ **Specifications based on application tests:**

- not just physical and/or chemical properties

⇒ **Value-to-Client Analysis**

- Process simulation – Quantify the influence of each key parameter

The path to Profitability – VTCA (Value-to-Client Analysis)

- **“Food for Thoughts”:**
  - Collaboration of all involved parties: Marketing to determine possible markets, Production to determine key parameters, R&D/Consulting to design the testing simulation.
  - Targeted tests for specific applications – No need for testing without any future financial impact
  - The closer the simulation to real conditions, the closer the lab results to industrial upgrade.

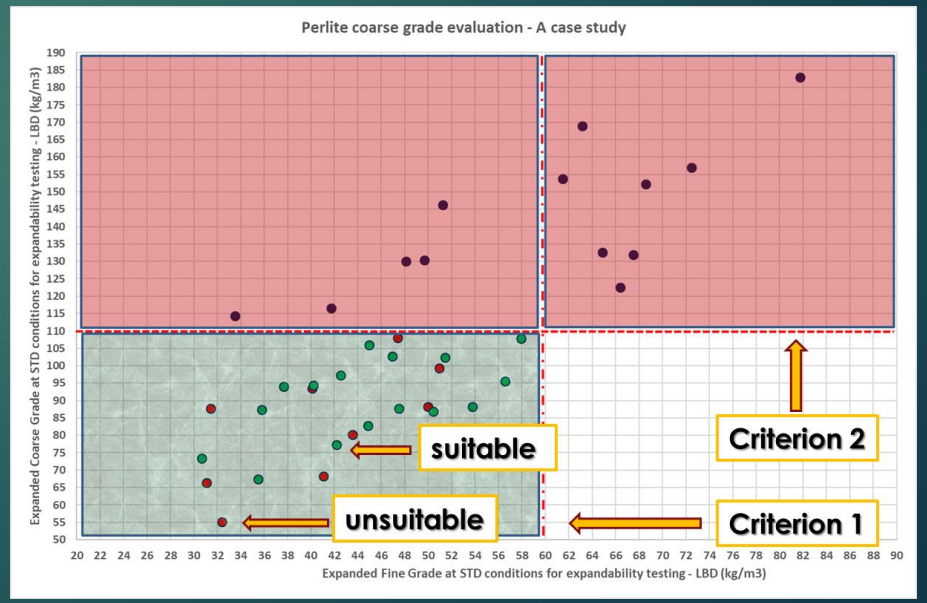
Example of services to maximize Value (A)

- **Smart Lab techniques for deposit mapping and feed-to-plants evaluation**
  - various grades expansion,
  - testing methodologies – screening criteria
  - following specific standard procedures

- **Case study: Perlite coarse grade evaluation**
  - Initial expansion of fine grades – Screening of results based on LBD
  - Expansion of coarse grades – Screening of results based on LBD & Yield
  - Evaluation of application properties – comparison with competition

Overall, 38 perlite samples from various from various qualities and places were tested for <u>Agro</u> applications Finally, 16 samples were characterized as suitable based on:

- ✓ *Energy consumption*
- ✓ *Yield*
- ✓ *Attrition resistance*
- ✓ *Water Retention*
- ✓ *Productivity*
- ✓ *Comparison to a reference*



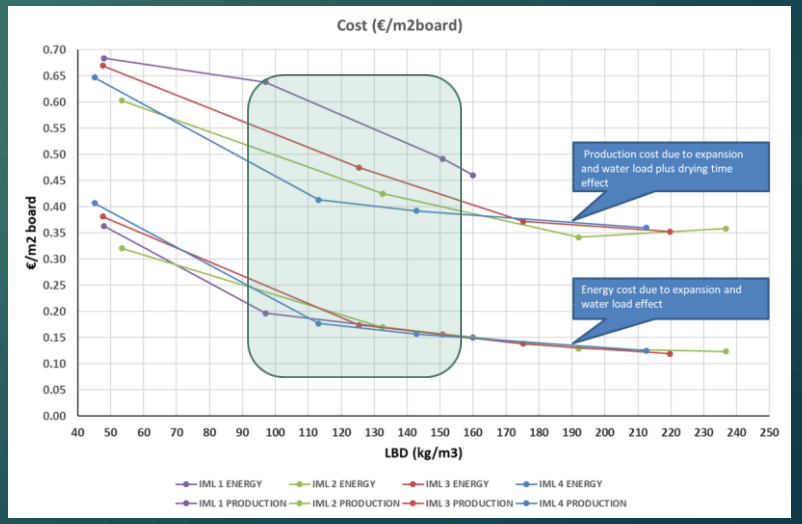
Example of services to maximize Value (B)

- **Smart Lab techniques for deposit mapping and feed-to-plants evaluation**
  - Evaluation of various new perlite occurrences of high value-in-use (e.g. specific uses)
  - Technical Support to Customers (maximizing Value-To-Client per grade/customer)

- **Case study: Perlite fine grade evaluation for Ceiling tiles applications**
  - Differentiate perlites i.e. based on drying mechanism (holistic VTC approach for cases where drying cost is highly affecting the total process)
  - Competition analysis

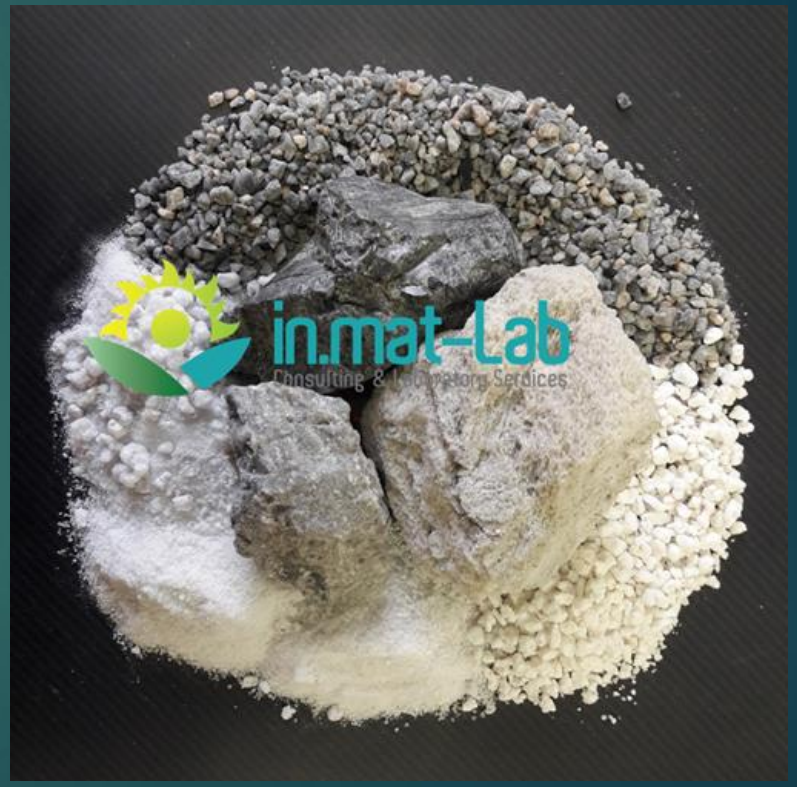
Conclusions with cost estimation per unit of production:

- ✓ *Water Retention is mainly influenced by the LBD of the expanded perlite*
- ✓ *Drying rate is greatly influenced by the characteristics of the expanded perlite*
- ✓ *Drying Time affects the efficiency of the drying process line and finally the overall production cost*



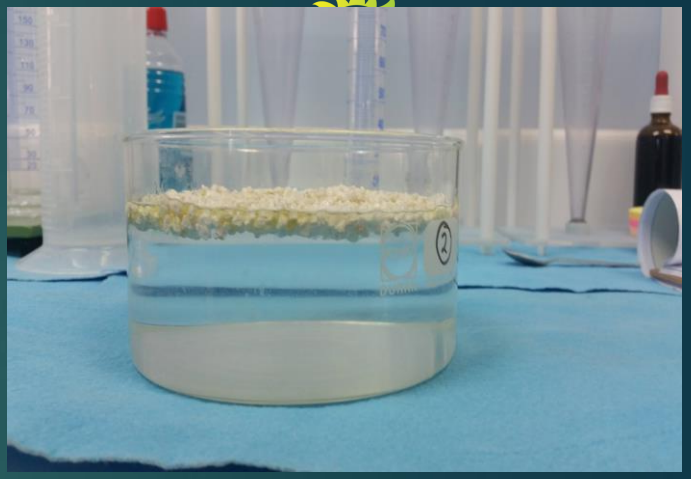
Drivers of Innovation

- Customer's business, Targets and needs
- Regulations
- Emerging and Dying Technologies
- Competition
- Strategic alliances and Partnerships
- ***Mega Trends***
  - Resources scarcity
  - Demographics
  - Climate change
  - Digitalization, AI



Research & Development

- Design and administrate R&D projects
- Apply for grants through national and European projects
- Support in prioritizing R&D ideas based on market data
- Perform technical and marketing feasibility studies
- Establishing a network of experienced partners



in.mat-Lab Projects for 2021-2022

- ***Perlite Microspheres Lab Production and Testing***

  (internal funded - running)

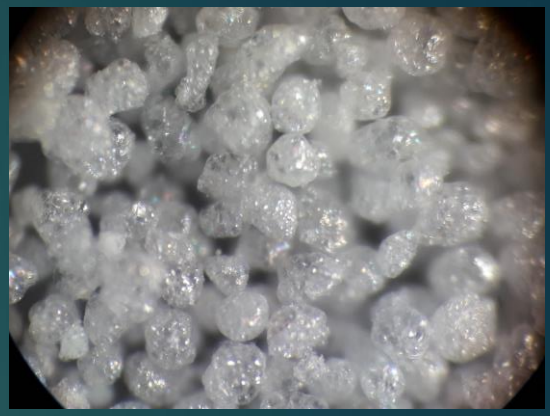
- ***T2EΔK-02398 LiCom-Perl***

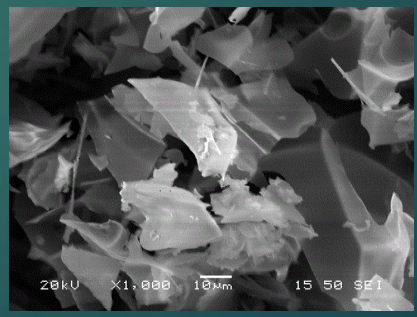
  (ESPA national co-funding project- running)

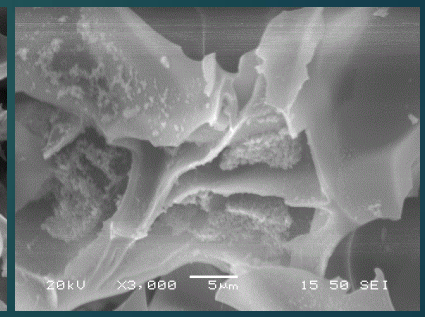
- ***Cluster e-CODOMH***

  (ESPA national co-funding project- running)

- ***New Advanced R&D Projects***
  - Pilot testing facilities for perlite expansion and final applications testing (i.e. “a greener greenhouse” etc.)
  - AI – smart mining/exploration







Thank you for your attention

Innovative Insulating & Inorganic Materials Laboratory

Lavrion Technological & Cultural park, P.O. Box 504, 195 00, Lavrion, Greece

T: +30 2292 300659, M: +30 69747538 & +30 6977692680

e-mail: info@in-mat-lab.eu

Website: www.in-mat-lab.eu

You can also follow us in LinkedIn: https://www.linkedin.com/company/in.mat-lab

Perlite Institute
Associate member