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ADVANCED GROWING EM&TS

The EM&T sample described on this datasheet is one of the materials from a controlled cultivation of organisms (bacteria, yeast, algae, mycelium, etc.) that are directly grown and/or manufactured into their subsequent form, function and performance by tapping into the organisms natural growth behaviour (bio-fabrication). SELF-HEALING EM&Ts: Material capable to repair damages occurring within 'themselves', in part or whole.

Malai Biocomposite

Made from Malai

<https://malai.eco/>

 **NATURALS**
Derived from
Microorganism

MATERIAL FEATURES AND COMPOSITION

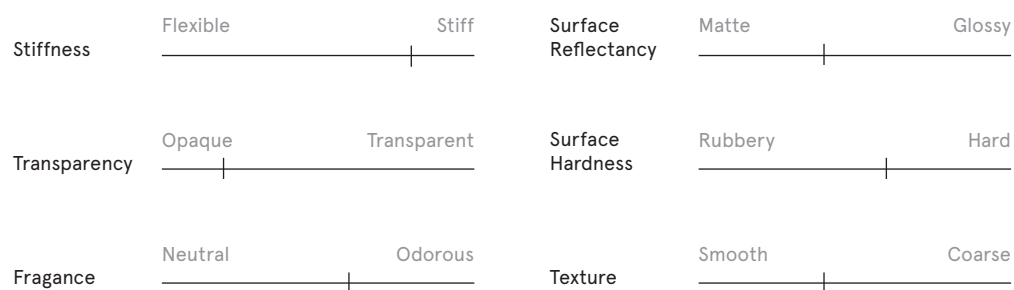
Leather-like biocomposite material
made from coconut water waste and
bacterial cellulose.

AVAILABILITY

TRL 8 - System complete and qualified
Commercially available in small amount

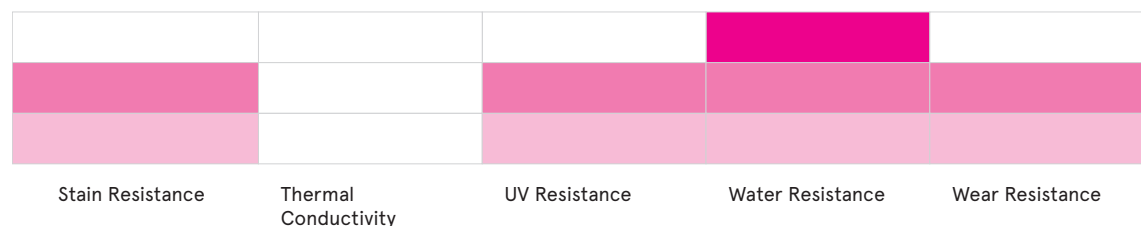
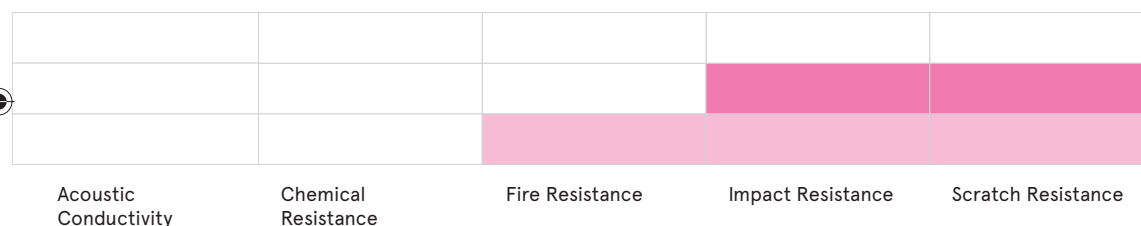


PHYSICAL QUALITIES



DATEMATS project (Knowledge & Technology Transfer of Emerging Materials & Technologies through a Design-Driven Approach Agreement Number: 600777-EPP-1-2018-1-IT-EPPKA2-KA) is co-funded by the Erasmus+ programme of the European Union.

PERFORMANCE PROPERTIES



UNDERSTANDING

*Please see the Glossary at the end of this booklet for more explanation on the terminology.



Photocatalytic

A substance that increases the speed of a chemical reaction by the effect of light or other forms of radiant energy.

Photochromic

Reversible color change induced by the indication of sunlight or UV. The color disappears when the fountain ceases.

Photoluminiscent

Is the emission of cold light caused by the absorption of electromagnetic radiation (visible light, UV, X and cathode rays). There are two types of luminescence: fluorescence (emits light only during absorption of radiation) and phosphorescence (stores absorbed radiation, so that it continues to emit light for a time after the stimulus subsides).

Shape Memory

The material with this property recovers its initial shape after being permanently deformed (plastically) when heated above a characteristic transition temperature of the material. In addition, while regaining its form, in some cases it is able to perform work. The characteristics of these materials, depending on the temperature, contemplate superelasticity (which grants large elastic deformations in a specific range of temperatures), simple shape memory effect (in which the material

remembers a single shape, when heated) and which can be educated to achieve a double shape memory effect (in which the material memorises two shapes in a hot and cold state).

Thermochromic

Reversible or irreversible color change induced by temperature changes.

Thermoelectric

Property that supposes a change of voltage in response to a variation of temperature and vice versa.

SUSTAINABILITY PROPERTIES*

Biodegradability	Compostability	Recyclability	Recycled Pre-Consumer Waste	Renewable Content	Recycled Post-Consumer Waste

SMART PROPERTIES*

Electrorheological	Magnetorheological	Piezoelectric	Phase Change Material (Pcm)	Photocatalytic

Photochromic	Photoluminiscent	Shape Memory	Thermochromic	Thermoelectric

GLOSSARY

CERTIFICATES & TESTS

PETA-Approved Vegan.
All information has been provided by the companies and/or material suppliers that delivered the EM&Ts samples.

SUPPLY

Raw Material

Processed Material

System / Product



SHAPE



Pipe, Sheet

Recycled post-consumer waste

Post-consumer waste is the waste produced at the end of a consumer-product lifecycle. Post-consumer waste has served its intended purpose, passed through the hands of a final consumer, and has been discarded for disposal or recovery. It usually refers to the household waste we generate every day, and does not include manufacturing or converting wastes. Depending on the type of waste, governmental legislation and the action taken by the consumer, post-consumer waste is recycled, sent to landfill or incinerated.

SMART PROPERTIES

Electrorheological

Change in the rheological properties (viscosity and viscoelasticity) of a material caused by an electrical stimulus.

Magnetorheological

Change in rheological properties (viscosity and viscoelasticity) of a material caused by a magnetic field.

Piezoelectric

Phenomenon exhibited by certain materials, which when applying mechanical stress, generate electrical energy. The effect can also be inverse, that is, they can present small deformations when an electrical current is applied.

Phase Change Material (PCM)

Materials considered latent heat storage units: They are capable of absorbing or releasing a large amount of thermal energy when they undergo a phase change (from solid to liquid, from liquid to gas, or vice versa).

TRANSFORMATION PROCESSES



Additive Manufacturing



Die Cutting



Lamination



Textile Processing



Blow Molding



Extrusion



Metal Working Tools



Thermoforming
Compression Molding



Casting



Injection Molding



Printing



Welding



Cold Pressing /
Deep Drawing



Lab Growing



Rotomolding



Wood Working Tools

SHAPING



SUSTAINABILITY PROPERTIES

Biodegradability

Ability to be broken down into carbon dioxide, water, and biomass by the natural action of microorganisms (aerobic and/or anaerobic). It is misleading to merely claim biodegradability without any standard specification. If a material or product is advertised to be biodegradable, further information about the timeframe, the level of biodegradation, and the required surrounding conditions should be provided, too.

Composting

Ability to go through the process by which materials biodegrade through the action of naturally occurring microorganisms and do so to a large extent within a specified timeframe. The associated biological processes will yield CO₂, water, inorganic compounds, and biomass which leaves no visible contaminants or toxic residues. The products can be classified in "Home compostable" or "Industrial compostable", having each of them specific temperatures, conditions and timeframes defined by international regulations.

Recyclability

The capacity of a product to be reduced all the way back to its basic materials, reprocessing those materials, and using them to make new products, components or materials. Recycling refers to materials that are processed in practice (as opposed to materials for which recycling is technically feasible), this varies from one region to the other invoking the regulations and technologies of each country.

Recycled pre-consumer waste

Pre-consumer waste refers to waste produced by manufacturers or industries before released for consumer use. Pre-consumer waste refers also to the reintroduction of manufacturing discards back into the manufacturing process, in this case it is often not considered "recycling" in the traditional sense. Pre-consumer waste is produced in large quantities, while this is easier to collect and sort, high amounts of pre-consumer waste are non-recovered.

Renewable content

Materials that are replenished at a rate equal to or greater than the rate of depletion and must be produced using regenerative practices or, in a transition phase, using sustainable practices.

MANUFACTURING PROCESSES

Malai places the wastewater into vats for sterilization, resulting in an entirely natural, energy-rich nutrient upon which bacterial culture can feed when combined. The fermentation period takes between twelve to fourteen days.



GLOSSARY

APPLICATION FIELDS

Applications include fashion, accessories, bags, packaging, stationery, interior surfaces, and furnishings. For future use, this material prior to the refinement stage is very promising in various fields such as the cosmetic industry for making rejuvenating face masks, food industry as a thickener or a dessert, or in the medical industry for developing biocompatible body implants.



CASE STUDY

In 2018, Malai expanded its portfolio by designing product prototypes. A crowd-funding campaign was mooted and 10 products — bags and accessories included — are now in production. They were showcasing their new collection at LFW Winter/Festive 2020 and at Neonyt Berlin 2020, the international fair for sustainable fashion.

COMPARISON & INNOVATION

It has a similar feel to animal leather and can be used in similar applications, but it is vegan, does not use toxic tan materials and it is also compostable.



APPLYING