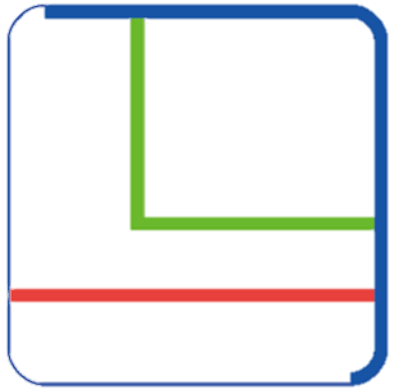


Guarding Against Every Fire Risk

Moo Nui Factory



Flame-retardant
Non-combustible(semi)
Fire Blocker

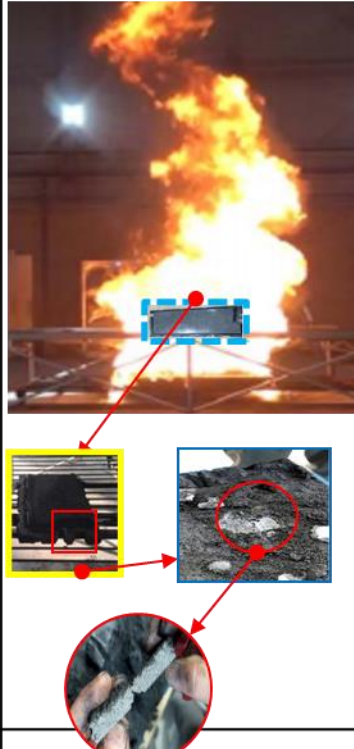


WAKANDA PROJECT

STEP 1 ▶



STEP 2 ▶



STEP 3 ▶

Test Summary					
UL94 V-0					
Material: SM23-P01					
Color: NC					
Thickness: 4.0mm					
Flame: V-0					
Test Date: 2023-06-13					
Equipment NO: 172038					
Test Item: 7-days					
Temp: 70°C					
Start Date / Time: 2023-06-13 17:00					
End Date / Time: 2023-06-21 16:00					
Equipment NO: 124042					
Test NO: 1					
Temp: 23°C Humidity: 15%RH					
Start Date / Time: 2023-06-20 17:01					
End Date / Time: 2023-06-21 16:00					
Equipment NO: 45516					
50W (1250W) VERTICAL FLAMING TEST: SV, 5VA (PLAQUE SPECIMENS)					
[M] IEC 60338-20:2020, Section 9 [I] IEC 60338-20:2020, Section 4.2.1					
[I] ASTM D3021 Rev A, Section 2020-09 [I] IEC 60338-20:2020, Section 4.2.1					
Set: 3 Material: SM23-P01 Color: NC Test Date: 2023-06-21					
[a] >48h/23±2°C/50±10%RH [a] 36h±2h/70±2°C + >4h/23±2°C<20%RH					
Thk (mm)	Burn Through (Hole?)	12,873	[] Yes [X] No	4,12,775	[] Yes [X] No
12,809	[] Yes [X] No	5	12,887	[] Yes [X] No	-
12,711	[] Yes [X] No	6	12,644	[] Yes [X] No	-
Scope: Newa Plaque Specimen Criteria [X] Yes [] No					

STEP 4 ▶

Test Summary					
UL94 V-0					
Material: SM23-P01					
Color: NC					
Thickness: 4.0mm					
Flame: V-0					
Test Date: 2023-06-13					
Equipment NO: 172038					
Test Item: 7-days					
Temp: 70°C					
Start Date / Time: 2023-06-13 17:00					
End Date / Time: 2023-06-21 16:00					
Equipment NO: 124042					
Test NO: 1					
Temp: 23°C Humidity: 15%RH					
Start Date / Time: 2023-06-20 17:01					
End Date / Time: 2023-06-21 16:00					
Equipment NO: 45516					
50W (1250W) VERTICAL FLAMING TEST: SV, 5VA (PLAQUE SPECIMENS)					
[M] IEC 60338-20:2020, Section 9 [I] IEC 60338-20:2020, Section 4.2.1					
[I] ASTM D3021 Rev A, Section 2020-09 [I] IEC 60338-20:2020, Section 4.2.1					
Set: 3 Material: SM23-P01 Color: NC Test Date: 2023-06-21					
[a] >48h/23±2°C/50±10%RH [a] 36h±2h/70±2°C + >4h/23±2°C<20%RH					
Thk (mm)	Burn Through (Hole?)	12,873	[] Yes [X] No	4,12,775	[] Yes [X] No
12,809	[] Yes [X] No	5	12,887	[] Yes [X] No	-
12,711	[] Yes [X] No	6	12,644	[] Yes [X] No	-
Scope: Newa Plaque Specimen Criteria [X] Yes [] No					

WAKANDA-X

STEP 5 ▶



Certification [UL94 V0/5VA]

Component - Plastics
Guide Information
View Certificate of Compliance
E534480

FNB
18-45 Muneondong-Gil, Hwaseong Gyeonggi-do 18623 KR

SM23-P01
Polyurethane (PUR) "RF-FOAM", furnished as finished parts

Color	Min_Thk (mm)	Flame Class	HVI	HAI	RTI Elec (°C)	RTI Mech (°C)	RTI Str (°C)
NC	4.0	V-0	-	-	50	50	50
	13.0	V-0	-	-	50	50	50

Comparative Tracking Index (CTI) -
Dielectric Strength (kV/mm) -
High-Voltage Arc Tracking Rate (HVTR) -
Dimensional Change (%) -

Inclined Plane Tracking (IPT) KV -
Volume Resistivity (10¹² ohm-cm) -
Surface Resistivity (10¹² ohms/square) -
High Volt, Low Current Arc Resis (D495) -

ANSI/UL 94 small-scale test data does not pertain to building materials, furnishings and related contents. ANSI/UL 94 small-scale test data is intended solely for determining the flammability of plastic materials used in the components and parts of end-product devices and appliances, unless the applicability of the combination is determined by UL.

Report Date: 2023-06-19
Last Revised: 2023-06-19

© 2023 UL Solutions

UL
ALSO CERTIFIED TO IEC REQUIREMENTS

Patent

특허증
CERTIFICATE OF PATENT

특허 번호: 제 10-2582216 호
출원 번호: 제 10-2022-0181019 호
출원 일자: 2022년 12월 21일
특허 일자: 2023년 09월 20일

발명자: 이인진
출발명: 이인진

특허청
KOREAN INTELLECTUAL PROPERTY OFFICE

이인진

본 발명은 「특허법」에 따라 특허출원에 등록되었음을 증명합니다. This is to certify that, in accordance with the Patent Act, a patent for the invention has been registered at the Korean Intellectual Property Office.

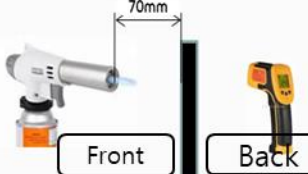
R&D

Available Technology for Good

HARU TECH
2022-2024
KICT 패밀리기업
한국과학기술연구원 Family Company

Material injection/printing
Mica solution structure
Transferred Mica

1,000°C or higher, Heat the product with a torch for 3 minutes at 70mm intervals and measure the temperature on the opposite



487.33543 단계 C: 회열 (간접노출) 단계 B 종료 직후 연소 중인 연료통과 시험용 사이에 스크림을 놓고 소원 화염에 추가로 60초 동안 노출한다. 제작자 요청 시 단계 C 대신 단계 B를 60초 더 실시할 수 있다.

그림 C 단계 C: 회열 간접노출

▶ After heating at least 1,000°C, 70 seconds exposure to burning fuel flame

Evaluate the combustion pattern of the product and the degree of flame propagation to the surrounding area when the flame is applied in the vertical direction of the plastic product



Evaluating the residual salt time and flame propagation pattern of the specimen, assuming that a large flame is generated



To evaluate the thermal and mechanical performance of the battery casing in response to stress caused by thermal runaway of the lithium-ion battery used in EVs, it is planned to be carried out using the UL2596 test method



A construction-material scale product



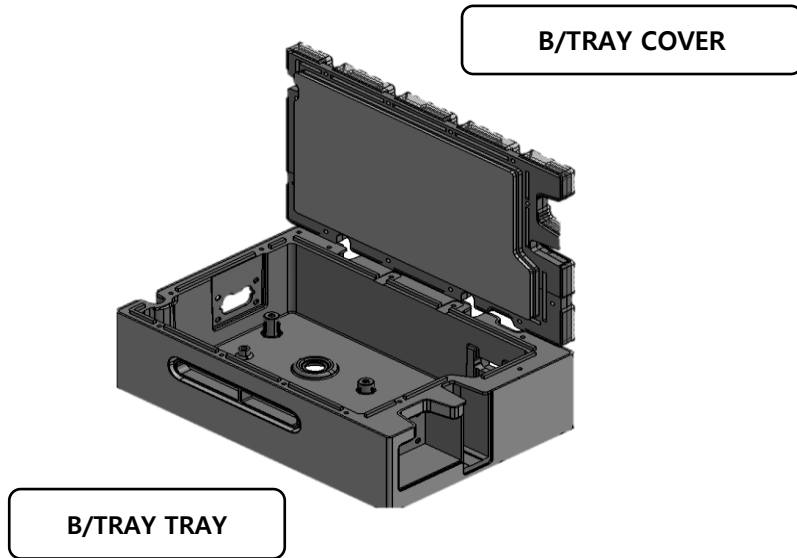
- ✓ A construction-material scale product that can establish a fire-resistant filling system in the wiring, piping, ducts, walls, floors, or ceilings.
- ✓ Available in various forms, such as fibers, sheets, fabrics, and panels, allowing for efficient utilization in the required sections.




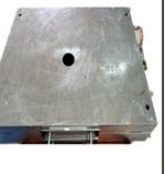
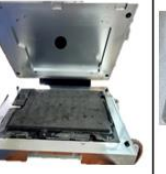

Tiles for room-scale

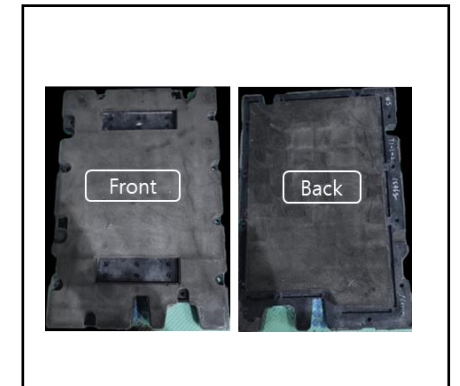


- ✓ Tiles for room-scale that can be used for interior and exterior applications, suitable for hospitals, homes, and storage of valuable items.
- ✓ Various finishes can be utilized through surface treatments and film attachment.

For battery and beyond(customizing)



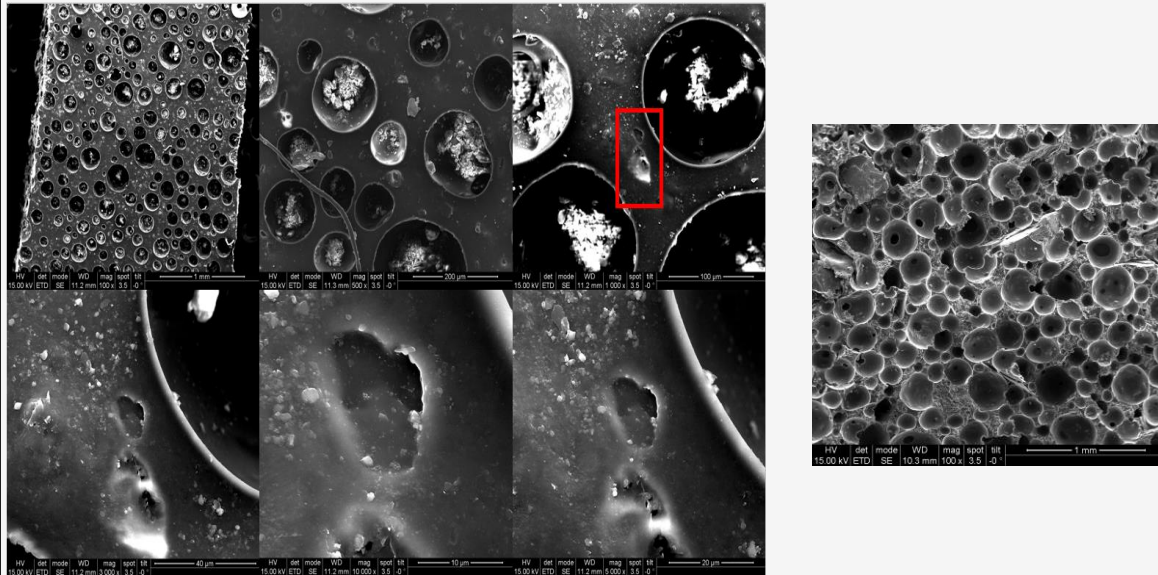
PU Foaming Process					
①	②	③	④	⑤	⑥
					
PLASTIC CORE	OPEN MOLD	INSERT CORE	CLOSE MOLD	FOAM	EJECT FOAM



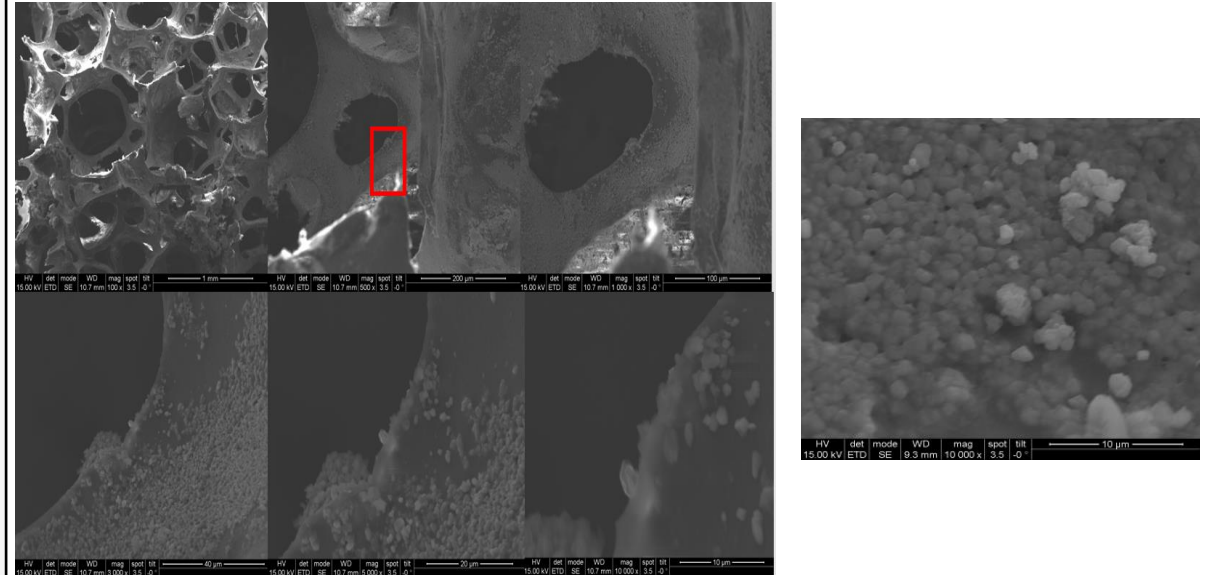
- ✓ By using Foam molding technology, the product's shape can be designed freely.
- ✓ This flexibility in shaping allows for its application in a wide range of fields, and it can be used in all areas with fire risks, such as batteries.

▶ **R&D/MOU - Analysis (HARUTECH, KIST)**

Fire Blocker



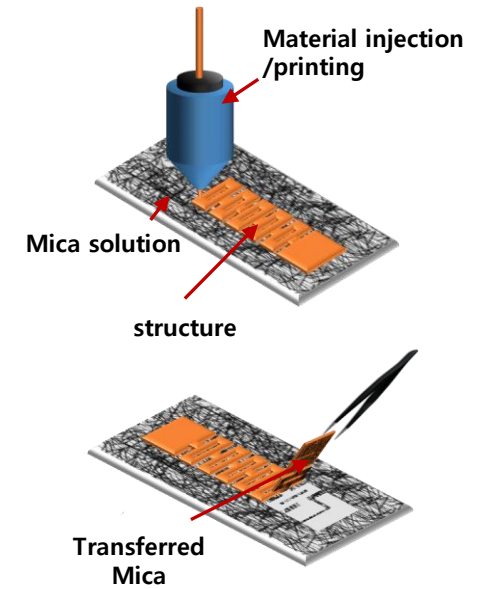
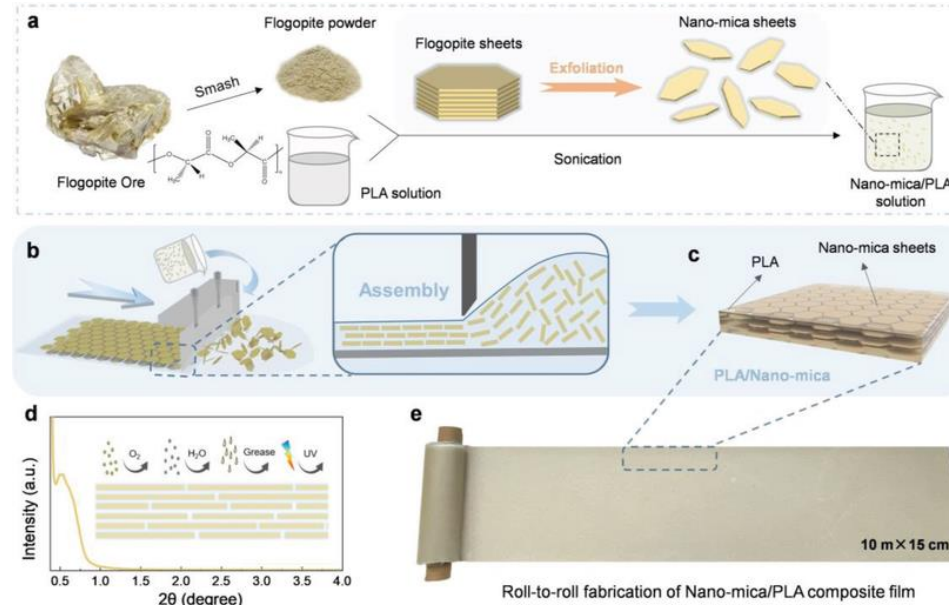
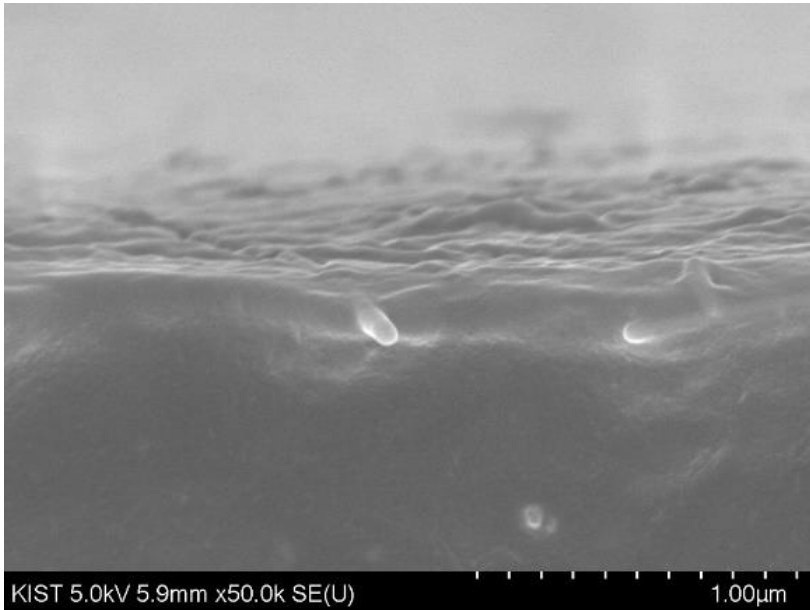
Comparison sample



- ▶ The basic grain size is over 200μm and there are no pores.
- ▶ On a cross-section, numerous grains exist due to the cut, but there is no porosity within the grains themselves, and there are no pores between the grains.
- ※ Given the dense, non-porous structure, it is deemed suitable for insulation and quasi-fireproof structures.
- ※ It is also speculated that it could serve as sound absorption and noise insulation material.

- ▷ Pores with a basic grain size of over 200μm
- ※ It seems feasible to use it as a cushioning material, but it is speculated to be inadequate for thermal insulation.

▶ R&D/MOU - (HARUTECH, KIST)



Nacre-Inspired Nanocomposite Films with Enhanced Mechanical and Barrier Properties by Self-Assembly of Poly(Lactic Acid) Coated Mica Nanosheets - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/Fabrication-of-the-nacre-inspired-Nano-mica-PLA-nanocomposite-film-a-The-exfoliation_fig1_360755933 [accessed 27 Oct, 2023]

- ✓ Research and development are in progress to incorporate fire detection sensor capabilities into materials by transferring nano-materials.
- ✓ Research and development are underway to enhance the thermal insulation properties of materials through the transfer of mica.