WORLD'S ONLY · FIBROUS AlN SINGLE CRYSTAL

Solving the thermal challenges of next-generation electronics

Thermalnite®

The world's only fibrous AlN single-crystal filler

High conductivity | Insulating | Fibrous shape

Fibrous aluminum nitride single crystal (Thermalnite®)

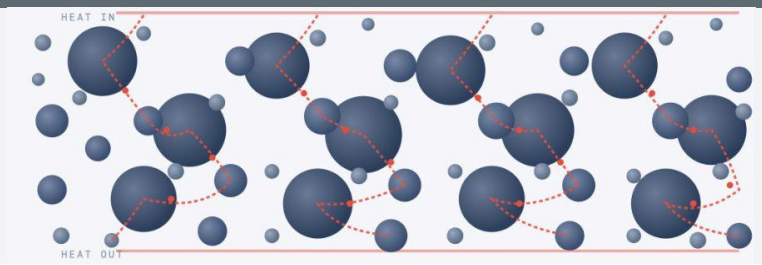
Challenge ISSUE

Conventional granular-filler design alone is hitting the ceiling on heat dissipation.

High granular-filler loading degrades processability and flexibility and raises resin viscosity, making it hard to balance performance and processability.

Mechanism MECHANISM

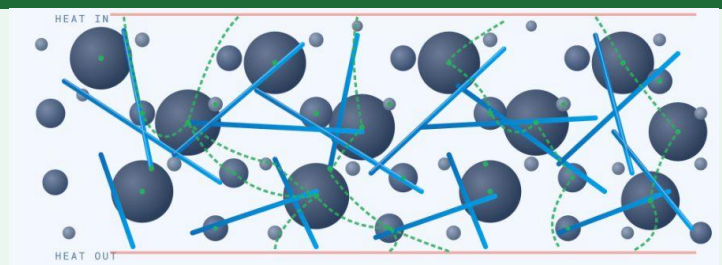
CURRENT / Conventional



Heat conducts via **point contacts** between fillers. Forming a network requires high loading, causing higher viscosity, poorer moldability and lower mechanical strength.

Granular filler (mixed sizes) | Close-packed type

PROPOSED



Fibrous filler bridges the granular fillers , enabling network formation even at low loading. Moldability and mechanical properties are both achieved.

Granular + fibrous (hybrid) | Blended with differently sized particles | Network-forming type

Performance gains vs. granular-filler loading

Mechanical strength	Softness	Thermal resistance	Thermal conductivity
×7	×2	1/4	15
vs. others	vs. others	vs. others · lower is better	max W/(m·K)

Hybrid design **maximizes composite performance.** Thermalnite®'s fibrous single-crystal structure forms continuous heat-conduction paths that are hard to achieve with granular filler alone, aiming for both better performance and processability.

NEW!

AI × SIMULATION Explore the target formulation from a vast space of blend conditions.

U-MAP Co., Ltd. | TOIC 601, Fukuro-cho, Chikusa-ku, Nagoya | Contact: info@umap-corp.com

HOW TO ENGAGE

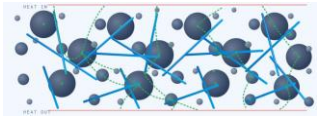
Three ways to engage — in the format that fits you

From raw material to components to co-design, adopt it to fit your development setup.

01 Buy the material

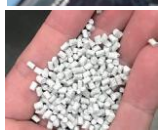
Hybrid filler

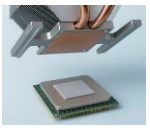
Optimized Thermalnite®
× granular-filler design



For material makers with their own formulations

APPLICATION



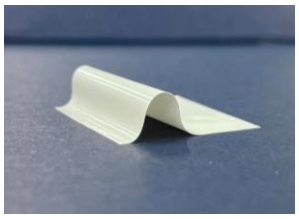


Gap filler / TIM sheet / Thermal grease / adhesive / thermoplastic resin / Bonding film / PCB substrate etc.

02 Buy the component

Heat-sink sheet / substrate

Heat-sink sheet ·
high-strength AlN substrate



For component makers without compounding equipment

APPLICATION

Power modules / LED · LD

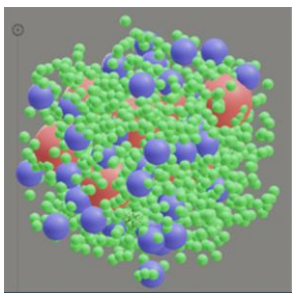
IC / ECU / power supply / telecom base station
Semiconductor mfg. equipment etc.

03 Entrust the design

Materials-design AI + co-development

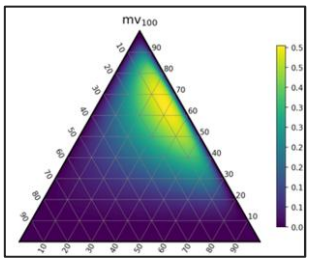
Simulation × machine learning
(customizable)

Packing-analysis model →



Max packing fraction for given sizes & ratios Visualize filler contact & proximity Visualize filler heat-transfer ease

ML-based packing example →



Combined with machine learning to predict from computational / experimental models and output the thermal-conduction / molding window

For companies wanting to extend dev resources (filler makers / material makers)

TECH CORE / Supply system

Mass production established

Stable Thermalnite® production enabled.

ISO 9001 / 14001 certified

Obtained at the production plant.

20+ patents filed in Japan & abroad

Filed for Thermalnite® and composite components.

Struggling with heat? Reach out to us anytime.

For more on U-MAP's technology and products, scan the QR code at right.

Contact us here

WEB https://umap-corp.com/contact

Contact page

Technical & product brochure (PDF)

U-MAP Co., Ltd. | TOIC 601, Fukuro-cho, Chikusa-ku, Nagoya | Contact: info@umap-corp.com