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# CNT/Graphene Nanotech Super Heat Sink Technology

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Nanobell  
H&J Industries



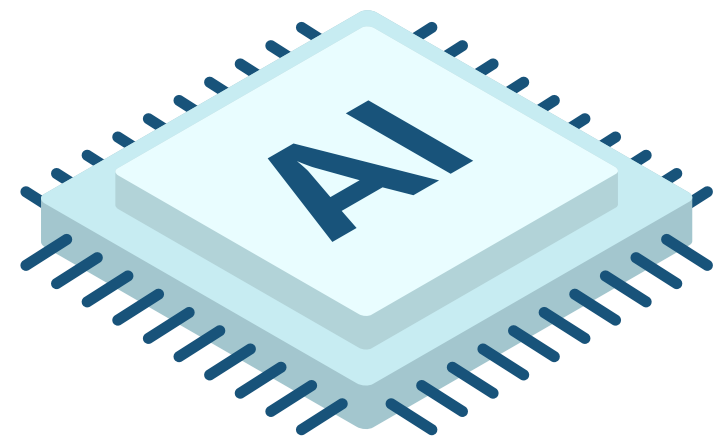
# Introduction to Super Heat Sink Technology

Overview: Advanced heat dissipation technology utilizing CNT/Graphene composites.

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# AI's Growing Energy Demand

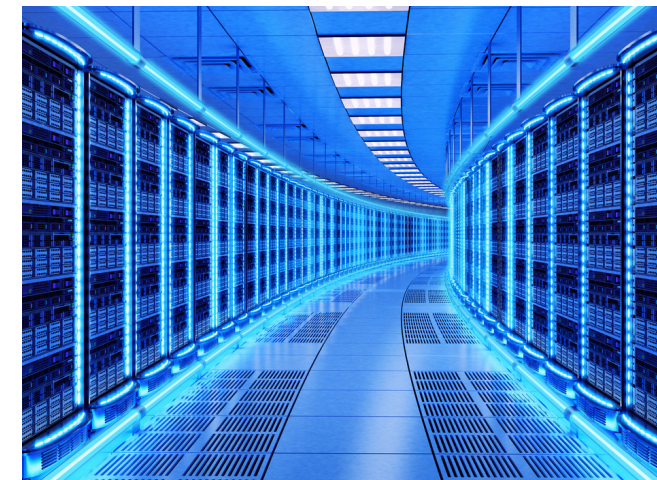


## Current Status:



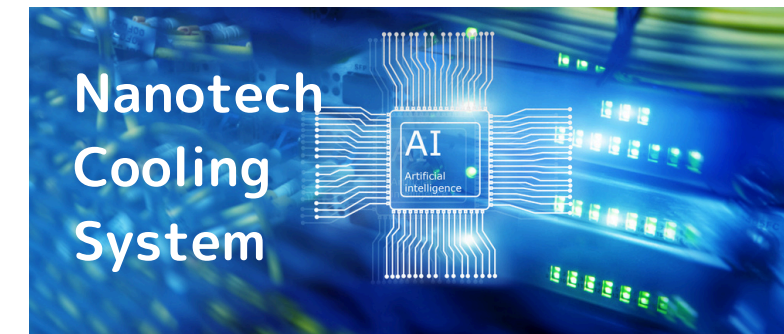
Data centers for training and running AI models consume about 1-2% of the world's electricity. Training GPT-3 requires over 1200 MWh, and a single ChatGPT query consumes about 2.9 watts.

## Future Predictions:



By 2030, data center power demand is expected to increase by 160%, with AI contributing to an annual increase of 200 TWh. In the US, data center power consumption is projected to grow from 3% in 2022 to 8% by 2030.

## Challenges and Opportunities:



The increasing energy demand necessitates improvements in energy efficiency and the adoption of renewable energy sources to support AI's future while minimizing environmental impact.

# Key Points of the Technology

## Utilization of CNT/Graphene Dispersion Technology:

Combines superior thermal conductivity of CNT/Graphene/nano Ag into a composite.

## Electroplating Technology for CNT/Graphene/nano Ag Composite

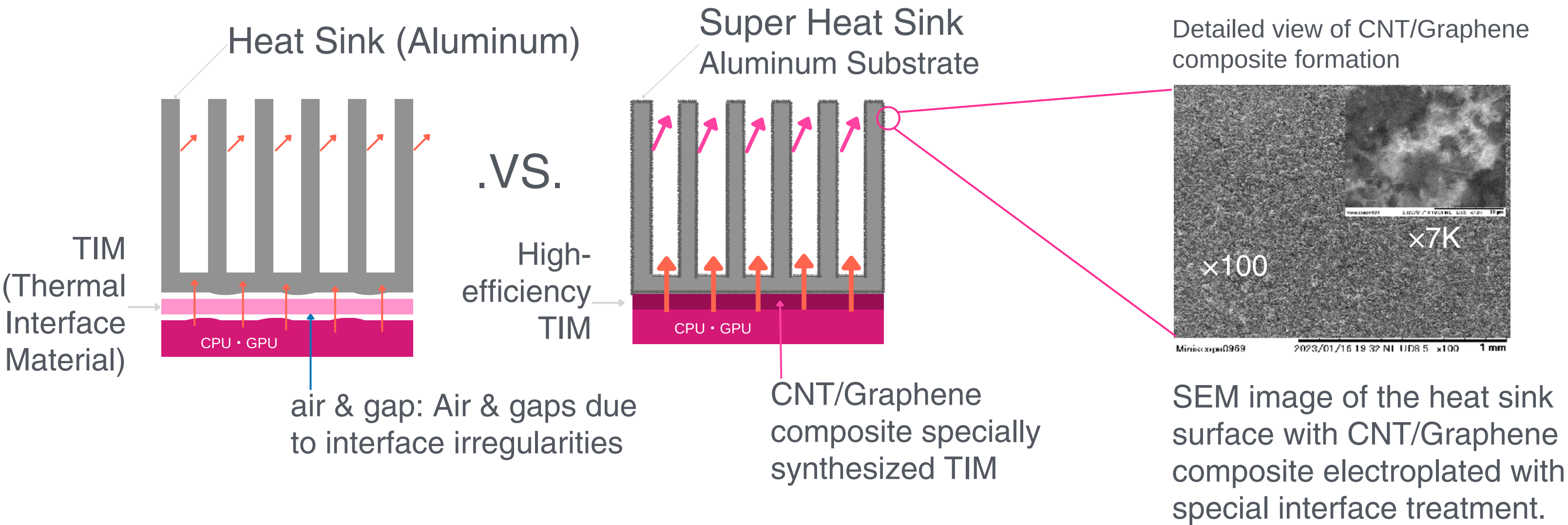
Develops thin films with special electrical surface processing on aluminum substrates, ensuring remarkable thermal conductivity characteristics while simultaneously enhancing mechanical strength and adhesion.

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## Optimized Composite Materials for Superior Thermal Conductivity

Ag/CNT composite materials are known to have higher thermal conductivity compared to single-phase Ag. This is due to the significant contribution of phonon conduction through the percolation network of CNTs. Furthermore, the optimization of composite material blending with CNT, Graphene, and Ag, combined with ultrasonic dispersion technology and proprietary electroplating techniques, achieves overwhelming thermal conductivity characteristics

# Technical Details



## TIM (Thermal Interface Material):

Explanation of TIM and its role in reducing thermal resistance and improving heat sink performance.

## Composite Formation:

The heat sink performance is dramatically improved due to the overwhelming increase in specific surface area and superior thermal conductivity.

Cooling Requirements:

Efficient cooling is essential for high-performance ICT equipment. Traditional air cooling is limited in effectiveness for high heat output scenarios.

Comparison of Cooling Methods

Air Cooling: Uses AHU and package air conditioning.

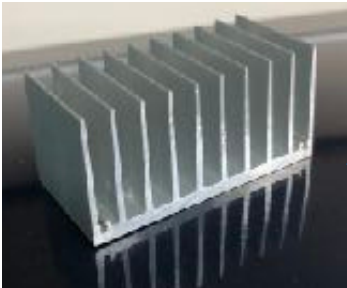
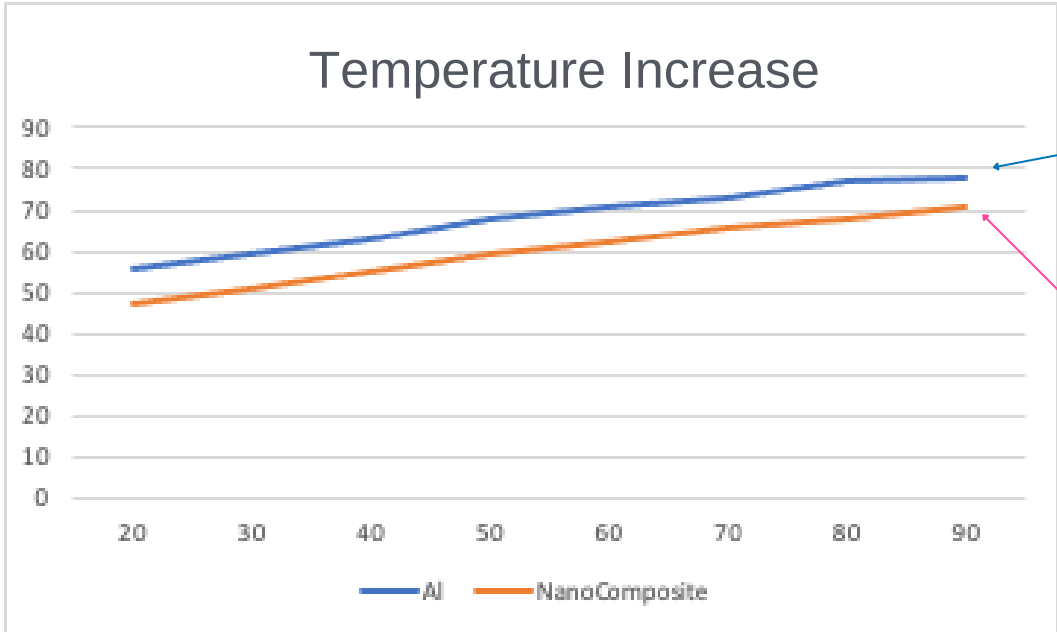
Liquid Cooling: Employs CDU and direct liquid cooling (DLC) for servers, improving cooling efficiency and reducing space requirements.

Cooling Efficiency:

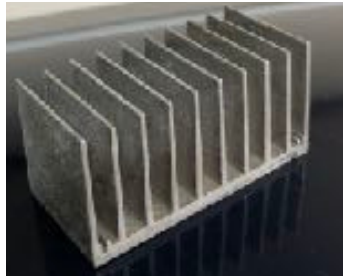
Liquid cooling methods offer better cooling efficiency with lower power usage effectiveness (PUE).



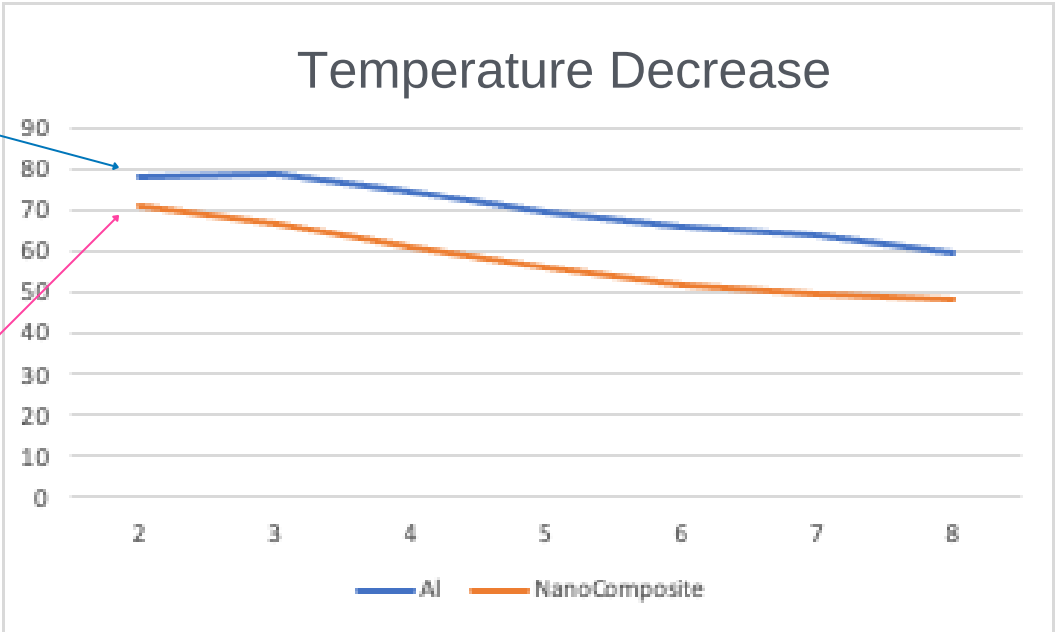
CNT/Graphene Super Heat Sink can be implemented as a high-performance heat exchange and dissipation device in all applications including AHU, CDU, and DLC.



Conventional Aluminum Heat Sink



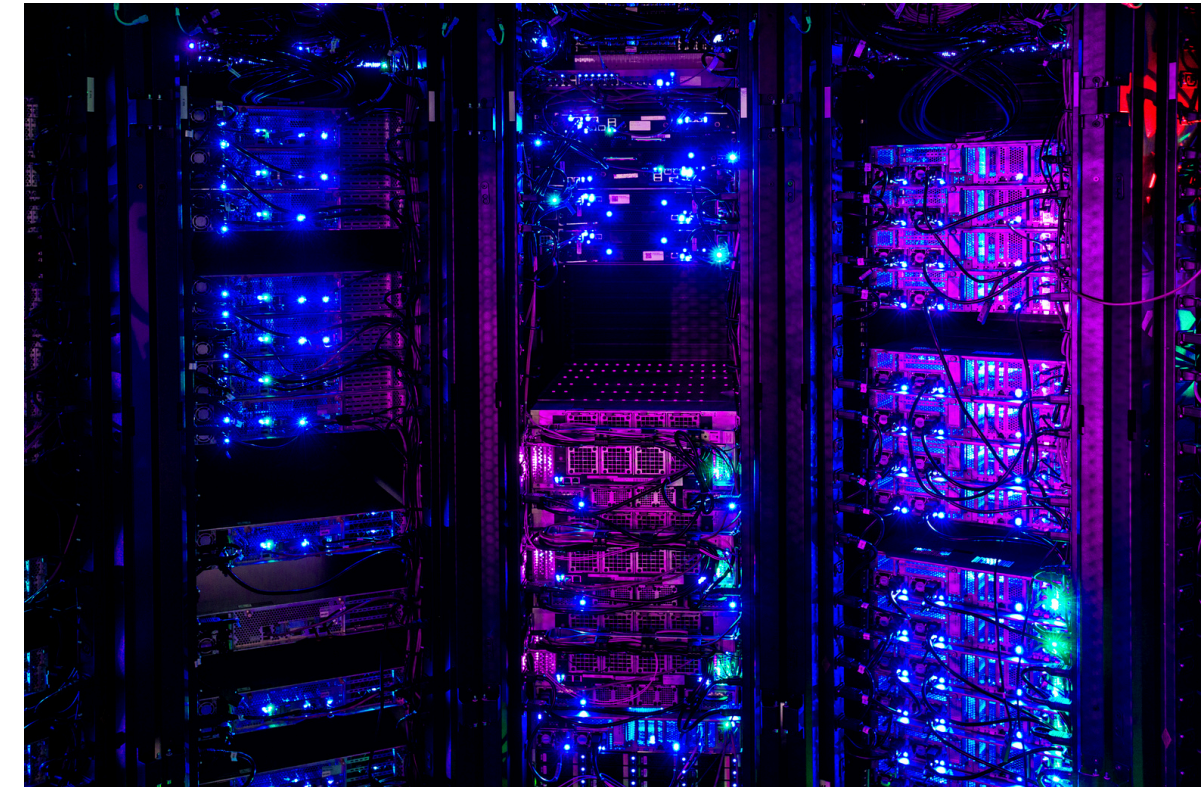
CNT/Graphene Super Heat Sink



Achieved an overwhelming improvement in heat dissipation characteristics by over 10°C.

This simple example compares a small heat sink for air cooling: an aluminum alloy heat sink (Blue) and a super heat sink (Red) using a comparative experiment (thermal control plate: IKA C-MAG HS7). The experiment compares only the heat sinks themselves, and it is expected that further performance improvement can be achieved by using our proprietary TIM in combination.

# Market Potential



## Global Market for Thermal Management:

Projected growth in demand for thermal management solutions due to the proliferation of AI data centers, electric vehicles, and 5G communication devices.

## Strategic Importance:

Crucial for energy savings, addressing social issues, and supporting growth strategies in various sectors. Additionally, leveraging Nanotech to tackle heat management challenges aligns with the Sustainable Development Goals (SDGs) and contributes to the creation of a sustainable society.

# Conclusion

## Summary:

Overview of the benefits and applications of Super Heat Sink Technology.

## Future Directions:

Continued innovation and market expansion in thermal management solutions.