

A SYSTEM AND METHOD FOR EFFICIENTLY TRANSFERRING HEAT FROM A HEAT SOURCE

IITM Technology Available for Licensing

Problem Statement

- As electronic devices become smaller and more powerful, the heat generated by their components increases, risking performance degradation and device failure.
- Limitations of Traditional Heat Sinks: Conventional solid heat sinks are inefficient and struggle to handle high heat fluxes.
- Furthermore, existing two-phase cooling systems, while addressing either boiling or condensation aspects, are often complex, expensive to manufacture, and may require high maintenance costs.

Intellectual Property

- IITM IDF Ref. **2503**
- IN 468268 - Patent Granted**

TRL (Technology Readiness Level)

TRL - 4: Technology validated in lab scale.

Technology Category/ Market

Category - Thermal Management Solutions, Electronics & Circuits

Applications- Electronic cooling systems, Aerospace and Automotive Industries

Industry- Consumer Electronics, Automotive and Transportation

Market - Global Electronic Cabinet Cooling System Market is projected to grow at a **CAGR of 3.4%**, increasing from USD 550.8 million in 2023 to USD 697.1 million by 2030.

Research Lab

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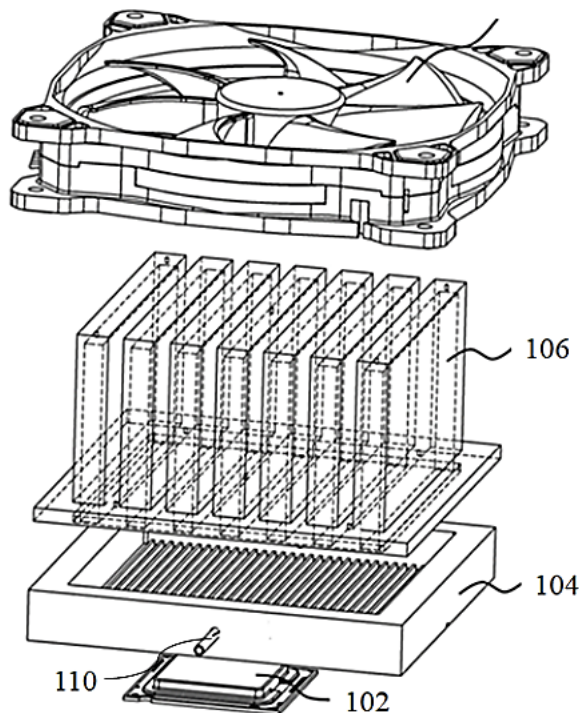


FIG. 1. Depicts/illustrates a system for efficiently transferring heat from heat sources.

Technology

1

The invention features a boiling plate with longitudinal fins or mini channels on top of the heat source to enhance surface area and bubble dynamics, improving heat transfer efficiency.

2

A condensing structure with superhydrophobic-treated hollow fins promotes efficient dropwise condensation, facilitating better heat transfer and return of liquid droplets to the boiling plate.

3

The system uses a working fluid that boils and condenses in a continuous cycle, transferring heat from the heat source to the ambient environment through combined boiling, condensation, and convective cooling.

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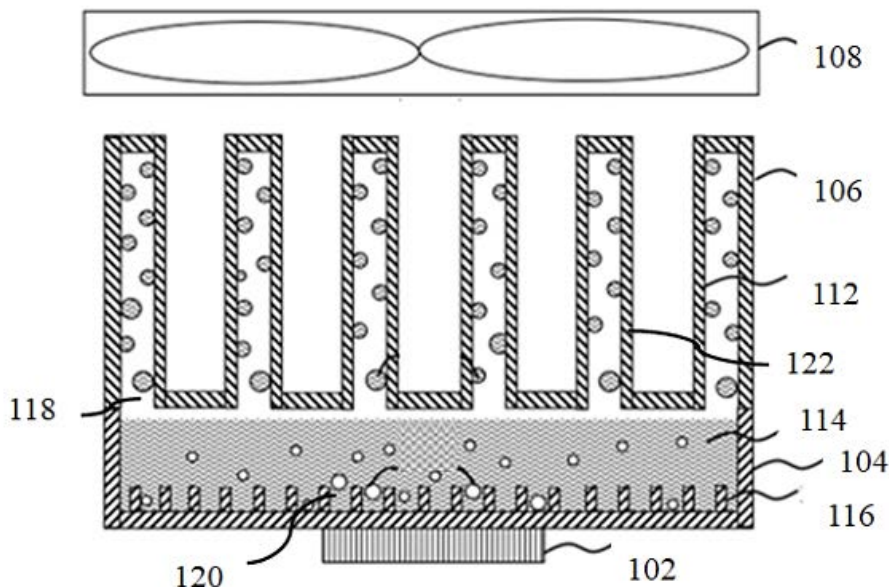


FIG. 2. Depicts/illustrates the cross-sectional view of the system for effectively transferring heat from a heat source.

Key Features / Value Proposition

1. Efficient Heat Transfer

The system provides efficient heat transfer from a heat source to fin arrays coupled with ambient air or other fluids, enhancing overall device performance.

2. Superior Condensation Technology

Utilizes a super hydrophobic inner surface in the condensing structure to promote dropwise condensation, significantly increasing the heat transfer coefficient.

3. Customizable and Scalable Design

The dimensions of the boiling plate and condensing structure can be customized and scaled based on specific cooling requirements, making it versatile for various applications.

4. Cost-Effective Manufacturing

The system can be fabricated through machining, casting, and 3D printing, offering a cost-effective solution compared to other cooling methods for high heat flux applications.

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