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LIQUID METAL IN LAPTOP THERMAL MODULE DESIGN

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Liquid Metal in Laptop Thermal Module Design

Abstract: A protective structure enables liquid metal to be used in electronic devices to improve thermal performance.

This disclosure relates to the field of thermal management in electronic devices.

A technique is disclosed that uses liquid metal to improve thermal performance while avoiding electrical conductivity and chemical reactivity problems when used in devices such as, for example, portable computers.

Increasingly higher power of electronic components, such as chipsets, are being deployed in electronic devices. In turn, this requires increased thermal dissipation within the device. Liquid metal is a thermal interface material (TIM) which has higher thermal conductivity than traditional thermal grease, and thus can improve thermal performance. It comprises Galinstan, which includes Ga, In, and Sn. However, Galinstan has undesirable side effects for use in electronic devices: it is electrically conductive, and reacts chemically with aluminum and copper.

According to the present disclosure, and as understood with reference to the Figure, a structure is provided to overcome the side effects while achieving the enhanced thermal performance of Galinstan. The structure includes a Silicon-based polymeric gap filler 10 that surrounds the heat source 20 (e.g. a chipset of the electronic device) to prevent outflow of the liquid metal TIM 30 where it could come into contact with other electrical components of the device. The filler does not react with liquid metal. In addition, a Ni coating is applied on the plate 40 of the thermal module in order to avoid a chemical reaction between the Galinstan and copper (or aluminum) of the module (the electrode potential of Ni is similar to gallium, and thus the Ni coating prevents contact of the liquid metal with Cu and Al).

The disclosed technique advantageously improves thermal conductivity of a thermal management solution.

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