NEW MATERIALS WITH HIGH THERMAL CONDUCTIVITY FOR ELECTRONICS

TECHNOLOGY DESCRIPTION

The Advanced Materials Laboratory of University of Alicante has developed a process to obtain low cost and high thermal conductivity composites ready to be used in several semiconductor devices as heat sinks.

Heat dissipation in the new generation of microelectronic, optoelectronic and power electronics devices is a very serious problem for the electronic industries.

Nowadays, a variety of materials can be used as heat sinks but they have various disadvantages as an excessive production costs, low thermal conductivity values or high thermal coefficients of expansion.

Materials obtained by the University of Alicante have a thermal conductivity over 200 Wm 1K 1 and a thermal expansion coefficient within the range 2-10 x 10-6 K-1 (measured in the temperature range 20-300 ° C, in at least two directions).

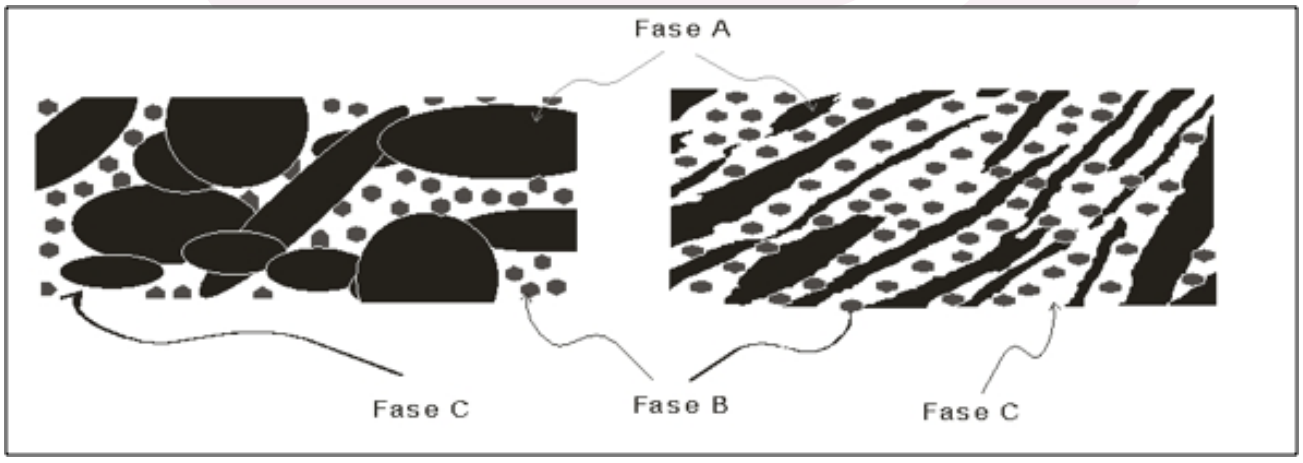
The developed composite material is composed of three phases:

• Phase A composed mainly of graphite flakes.

• Phase B which consists of either particles or fibers of a material that can used as a separator flakes. These materials preferably are ceramics or carbon fibers with a high thermal performance in at least one direction.

• Phase C consisting of a metal alloy.

Although the three phases must have good thermal properties, it is phase A (graphite flakes) the one responsible for the properties of this innovative material. Phase B acts as a separator (or spacer materials) of the layers of phase A enabling the infiltration of phase C which consolidates the preform.



Longitudinal and transverse views of the material

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APLICATION SECTORS

The composite material described can be applied mainly in the semiconductor industry for the manufacture of micro- and optoelectronic devices and power generators.

Additionally, it can be applied in any industrial sector for the manufacture of devices requiring a high thermal cooling capacity.

TECHNICAL ADVANTEGES AND INNOVATION

• The main innovation aspect of this technology is producing a material suited for simple and low cost manufacturing of heat sinks in the electronics industry.

• A thermal conductivity and coefficient of thermal expansion better than that of the components used traditionally (mainly formed by copper or aluminum).

• The composite material can be produced in the most appropriate forms and sizes for its subsequent processing (cutting, machining, polishing, etc.) and use.

• It's a lightweight material and presents high thermal conductivity values and a low thermal expansion coefficient at least two specific directions. It presents no problem for cutting, machining and polishing.

CURRENT STATE OF THE TECHNOLOGY

Several prototypes have been fabricated in order to evaluate their commercial and technical viability.

Advanced Materials Laboratory facilities

BANCO DE PATENTES
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INTELECTUAL PROPERTY RIGHTS

This technology is the result of a European project and belongs to the University of Alicante. This technology has several patent applications.

Spanish patent:
- Title:"Production of composite materials with high thermal conductivity".
- Application number: ES2304314.
- Application date: 27/03/2007.

University of Alicante has recently applied for the European patent (EPO) and the US application.

COOPERATION SOUGHT

Research group is looking for companies interested in acquiring this technology for commercial exploitation through:

- Patent license agreement.
- Transfer of rights of use.
- Transfer of manufacturing or commercializing rights to third parties, etc.

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