Method for the fabrication of aluminium matrix composites

Abstract

The proposed system concerns the production of aluminium matrix composites by infiltration, without the need to apply external pressure. The method has a great potential for different industrial applications because of its simplicity, the low cost and the possibility of obtaining end-products or semi-finished parts, with the desired size and shape, using a minimum number of mechanical processes.

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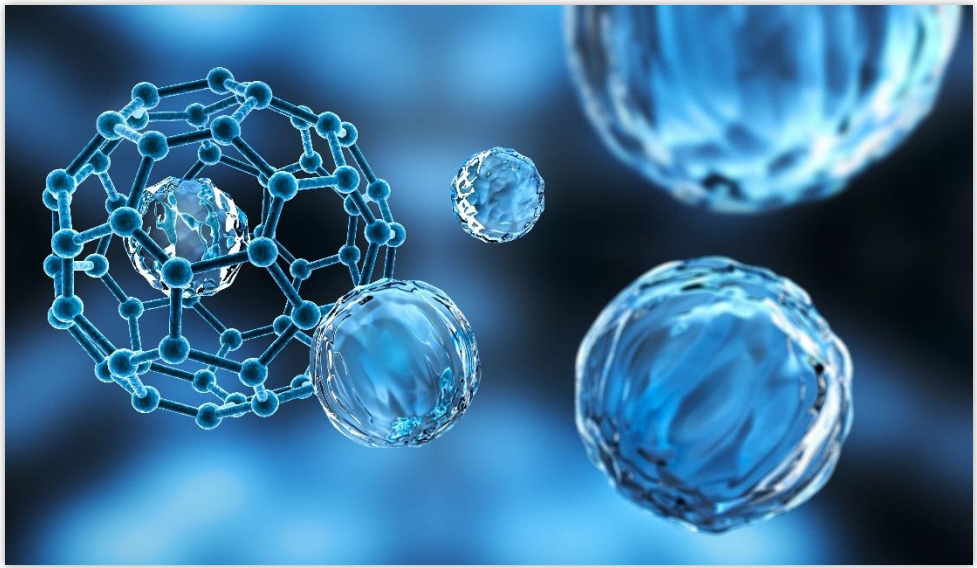

- ceramic reinforcement
- aluminium matrix composites
- preform
- pressureless infiltration
- wettability

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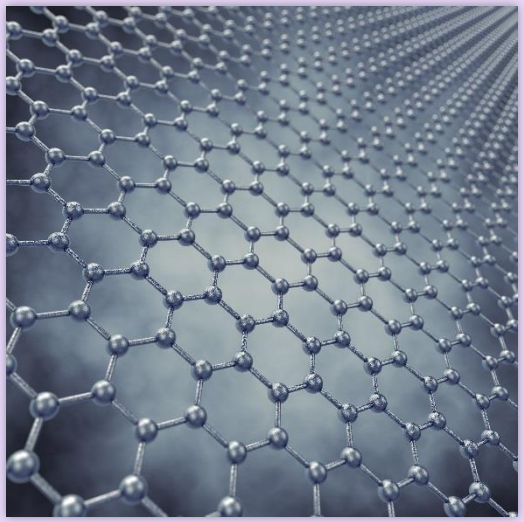
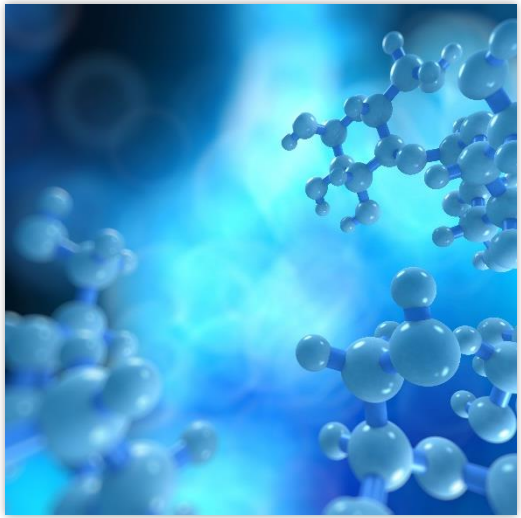


Description

The proposed system concerns the production of aluminium matrix composites by infiltration, without the need to apply external pressure.
The method entails preparing the preform of a mixture which contains at least one kind of ceramic reinforcement material along with aluminium powder. The compound is spontaneously infiltrated by molten aluminium under a protective environment, at the temperature range of 700 and 1500 degrees centigrade.

Applications

The method has a great potential for different applications because of its simplicity, the low cost and the possibility of obtaining end-products or semi-finished parts with the desired size and shape using a minimum number of mechanical processes. The main uses are in the automotive field for engine pistons, brake discs; in the aerospace industry for satellite parts, support frames; in electronic and optical instruments; in sports equipment such as bicycle chains, golf clubs.



Advantages

In general, it is difficult to produce aluminium matrix composites by pressureless infiltration, since molten aluminium hardly wets ceramic reinforcements. The advantages of the proposed technique concern the process simplicity and the wide applicability. In comparison to conventional systems, this procedure requires only the mechanical mixing of components without needing any restrictions on the type of aluminium alloy constituting the matrix. In the described production method, the wettability is obtained before infiltration owing to the mechanical mixing of components and there are not specific requirements on the composition of the alloy during the infiltration phase.
Furthermore, such procedure allows to obtain a good control on the final characteristics of the compound in terms of matrix and reinforcement percentage. In conclusion, the invented technique provides a more flexible and cost-effective fabrication process of aluminium matrix composites.

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