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Graphite-Reinforced Aluminum Composite

Metallic composites are a relatively new family of structural materials that combine the desirable properties of high strength, high tensile modulus, and low density. At the same time, they are useable over a wider temperature range than ordinary aluminum or magnesium alloys. The composites are generally formed by using a matrix of lightweight metal (aluminum or magnesium) and incorporating oriented, high-strength reinforcing fibers of a high-modulus, low-density refractory material such as boron or graphite.

A new aluminum composite, reinforced with nickel-plated graphite fibers, is prepared by applying an electroless nickel coating to graphite-fiber yarn, aligning the yarn between aluminum sheets in a stacked array, and heating the array to obtain diffusion bonding. The composite has several desirable features. For instance, the graphite fibers remain intact throughout the process, and undesirable aluminum/carbon reactions at the fiber surface are prevented by the nickel coating. Further, high-strength graphite fiber is much less expensive than some other commonly used reinforcing materials, has a greater potential for future reductions in

manufacturing costs, and, unlike other fibrous substances (particularly boron), yields a composite material that can be bent or otherwise formed without breaking the fibers.

Note:

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Patent status:

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