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Method for Producing Particulate Reinforced Composites Using Acoustic Vibrations

Applying acoustic vibrations to an in situ metal composite method improves strength, hardness, and wear resistance by yielding smaller, spherical reaction products and encouraging chemical cooling.

Alloys, such as steel, are hard materials composed of a mixture of different quantities of chemical elements. The composition of the alloy creates desirable physical properties. In situ methods are the most cost-effective techniques for creating these metal composites. One in situ method involves the addition of large particles to melted metal to create a reaction that forms a reinforced metal matrix. However, the strength of this new matrix is limited by the rate of the reaction and temperature at which the reaction occurs.

Purdue University researchers have developed a method to improve the noted in situ method by applying acoustic vibrations to separate the reaction products from the large particles initially added to the melt. This new method produces smaller, more spherical reaction products and encourages chemical cooling, making it possible to increase the strength, hardness, and wear resistance of many metals and alloys such as aluminum and magnesium. Al and Mg alloys, in particular, are lightweight materials that have increasing applications in the defense and transportation industries.

Advantages:

-Produces smaller, more spherical reaction products

-Encourages chemical cooling

-Increases strength, hardness, and wear resistance of Al and Mg alloys

Potential Applications:

-Materials

-Manufacturing

Technology ID

65690

Category

Materials Science & Nanotechnology/Advanced Functional Materials

Materials Science & Nanotechnology/Composites & Hybrid Materials

Chemicals & Advanced Materials/Materials Processing & Manufacturing Technologies

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