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Isostatic Pressure Spark Plasma Sintering (IP-SPS) Net Shaping Of Components Using Nanostructured Materials

Tech ID: 33894 / UC Case 2019-922-0

BRIEF DESCRIPTION

A novel manufacturing process that shapes complex components from nanostructured materials using a combination of pressure, heat, and electricity.

FULL DESCRIPTION

This technology involves a method and system for forming consolidated components with complex shapes from nanostructured, ultrafine grained, or microstructured materials. The process includes placing a preformed component in a chamber surrounded by a medium, then applying pressure and either heat or electricity to shape the component precisely. This method significantly improves upon traditional sintering and hot isostatic pressing (HIP) techniques, offering a faster, more efficient path to creating high-strength, complex-shaped components.

SUGGESTED USES

- » Aerospace: Manufacturing of complex, high-strength components for aircraft and spacecraft.
- » Biomedical: Creation of customized, durable medical implants and devices.
- » Automotive: Production of lightweight, high-performance parts for vehicles.
- » Defense: Development of advanced materials for military hardware with enhanced properties.
- » Electronics: Fabrication of components with precise dimensions and superior properties for electronic devices.

ADVANTAGES

- » Enables the shaping of complex components from advanced materials with precise control.
- » Reduces processing time compared to conventional sintering and HIP methods.
- » Limits grain growth, preserving the mechanical and physical properties of nanostructured materials.
- » Eliminates the need for metal capsules or cans required in traditional HIP, simplifying the process.
- » Applicable to a wide range of materials, including metals, ceramics, and composites.

PATENT STATUS

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OTHER INFORMATION

CATEGORIZED AS

- » **Materials & Chemicals**
 - » Ceramics
 - » Nanomaterials
 - » Other
- » **Semiconductors**
 - » Design and Fabrication
 - » Processing and Production
- » **Engineering**
 - » Other

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