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

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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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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 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

Country	Type	Number	Dated	Case
United States Of America	Published Application	2023-004568	02/09/2023	2019-922

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