Concentration Of Nanoparticles By Zone Heating Method

Tech ID: 27489 / UC Case 2016-523-0

SUMMARY

UCLA researchers in the Department of Mechanical and Aerospace Engineering have invented a novel method to concentrate nanoparticles (NPs) into metal crystals via zone melting.

BACKGROUND

Materials that contain high volume dispersed NPs can offer unusual mechanical, physical, and chemical properties for a variety of applications, including electronics, catalysis, energy, and lightweight materials for automobiles and aircraft. Normally, a low volume percentage of NPs (< 1-2 vol%) can be dispersed by most methods, such as ultrasonic, evaporation, or condensation. However, it is difficult to obtain a high-volume percentage (≥ 5 vol%) NPs in solidified materials, such as metals. Zone refining/melting is a well-established technique for crystal purification, but has never been used to concentrate NPs in molten materials before they are solidified. Solids with a high-volume percentage of NPs can be used for countless applications, but improvements to their synthesis and scalability must first be further developed.

INNOVATION

Researchers led by Professor Xiaochun Li have developed a novel method to improve the concentration of metal NPs (> 5 vol%) into a solid material by utilizing zone directional melting. Moreover, multi-cycles can be used to achieve a higher concentration of NPs in the final solid. This innovative method is easy to setup, can be readily used for mass production, and will have widespread applications in solidification nanoprocessing.

APPLICATIONS

- Composite nanomaterials
- Solidification nanoprocessing
- Lightweight, high performance nanocomposites
- Electronics, catalysis, and energy applications
- Lightweight materials for automobiles and aircraft

ADVANTAGES

- > 5 vol% NPs
- Multi-cycles can be used to increase NP concentration
- Zone melting process
- Scalable and can be mass produced

STATE OF DEVELOPMENT

Nanoparticle/metal solid materials have been successfully fabricated and their mechanical and physical properties have been tested.

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Evaporation-Based Method For Manufacturing And Recycling Of Metal Matrix Nanocomposites
- Super Ceramics With Self-Dispersed Nanoparticles Via Casting

CONTACT

UCLA Technology Development Group
ncd@tdg.ucla.edu
tel: 310.794.0558.

INVENTORS

- Li, Xiaochun

OTHER INFORMATION

KEYWORDS

Nanoparticles, NPs, zone melting, directional melting, mass production, electronics, catalysis, energy, lightweight materials, nanocomposite, nanoprocessing

CATEGORIZED AS

- **Engineering**
  - Engineering
  - Other
- **Materials & Chemicals**
  - Composites
  - Nanomaterials
  - Other
  - Thin Films
- **Nanotechnology**
  - Electronics
  - Materials

RELATED CASES

2016-523-0

UCLA Technology Development Group

10889 Wilshire Blvd., Suite 920,Los Angeles,CA 90095

tdg.ucla.edu

Tel: 310.794.0558 | Fax: 310.794.0638 | ncd@tdg.ucla.edu