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Battelle Number(s):

12234

Patent(s) Issued

Available for licensing in all fields

Available Technologies

Rare Earth Oxide Fluoride: Ceramic Nano-particles via a Hydrothermal Method

SUMMARY

A novel method for the synthesis of ceramic structures having nanometer dimensions that involves a simple hydrothermal precipitation reaction (i.e., supercritical water at high temperature). For example, an aqueous solution of DyBr and NaF at 450°C and 450 bar pressure for 17 hours afforded dysprosium oxide fluoride as nano fibers. This material is remarkably robust, surviving over 100 hours in various aqueous solutions at temperatures exceeding 400°C without re-dissolving or aggregating into larger sized morphologies. Other experiments provided platelet-type structures.

Due to the unique properties and robust character of these materials, they should be well suited for use as a high-strength material for fiber reinforcement of ceramic composites in applications at high temperatures and high stresses. Likewise, these materials may be used as high surface area supports for catalytic compounds. Further, given their inherent corrosion resistance this new material would be well suited for use as a corrosion resistant coating.

Details have been published: "Unusual dysprosium ceramic nano-fiber growth in a supercritical aqueous solution", M.M. Hoffman, J.S. Young, J.L. Fulton, J Mat. Sci. 35 (2000) 4177-4183.

U.S. DEPARTMENT OF ENERGY

Patents & Intellectual Property

» Patent #: 6,316,377

Technology Portfolio(s)

» Materials Synthesis and Functionalization

Potential Industry Applications

» Chemicals

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