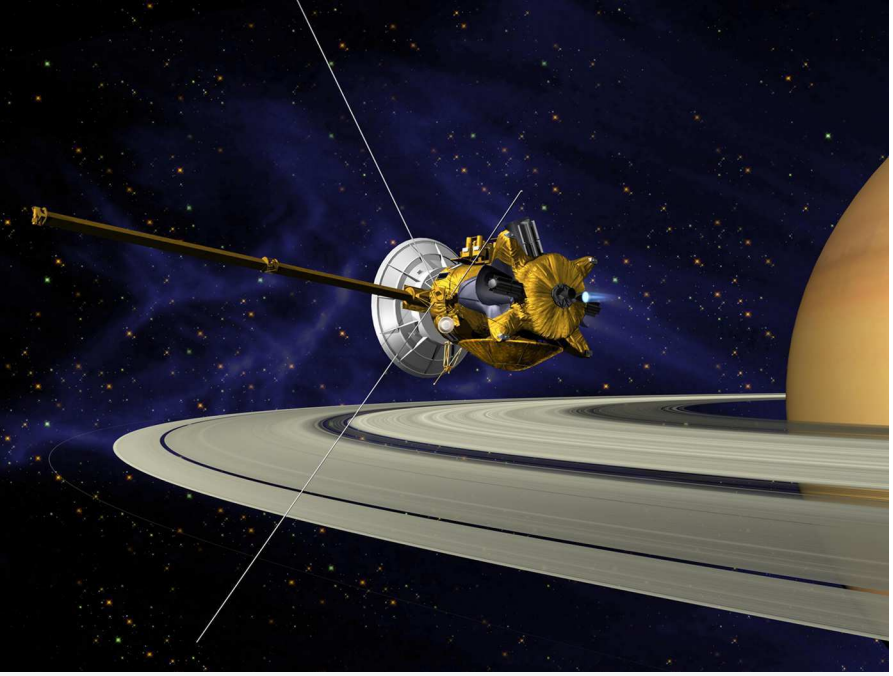


National Aeronautics and
Space Administration

Materials and Coatings

High Performance Thermoelectric Material

Method of creating micro-scale silver telluride grains covered with bismuth nanoparticles

NASA Langley Research Center has developed a novel thermoelectric material utilizing micro-scale silver telluride grains covered with bismuth nanoparticles. Thermoelectric (TE) materials have unique advantages in directly converting any level of thermal energy into electrical power and solid-state cooling by a reverse mode. Although thermoelectric devices are regarded advantageously with their high reliability, their lack of moving parts, and their ability to scale to any sizes; the devices energy conversion efficiency remains generally poor. This invention is for a TE material with high performance energy conversion.

BENEFITS

- High performance thermoelectric material
- Performance validated in laboratory experiments
- Simple and straightforward manufacturing process

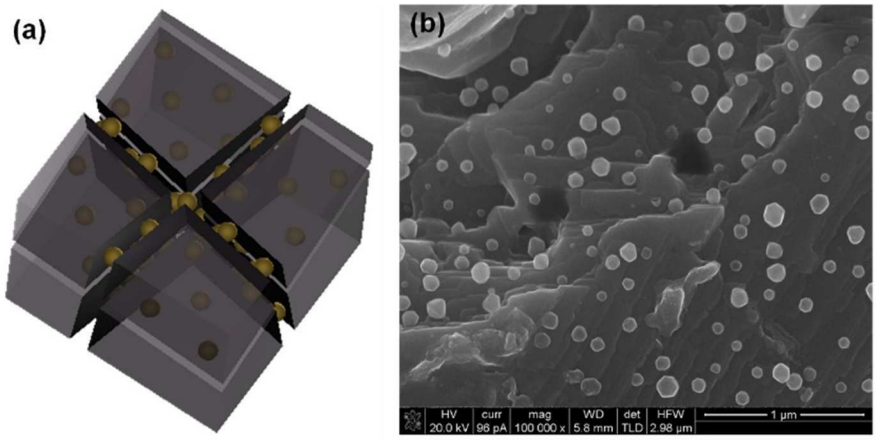
APPLICATIONS

- Power generation and waste heat recovery
- Refrigeration and cooling

technology solution

THE TECHNOLOGY

This invention is for a method of creating a material with enhanced thermoelectric performance. The material is created by surrounding crystalline semiconductors with nanoparticles by contacting a bismuth telluride material with a silver salt under a substantially inert atmosphere and a temperature approximately near the silver salt decomposition temperature; and recovering a metallic bismuth decorated material comprising silver telluride crystal grains. The materials performance has been validated in the lab and manufacturing should be straightforward.



(a) Graphical expression of material, and (b) SEM image of actual material

PUBLICATIONS

Patent No: 8,691,612

More Information

National Aeronautics and Space Administration

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NP-2015-08-2014-HQ

NASA's Technology Transfer Program pursues the widest possible applications of agency technology to benefit US citizens. Through partnerships and licensing agreements with industry, the program ensures that NASA's investments in pioneering research find secondary uses that benefit the economy, create jobs, and improve quality of life.

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