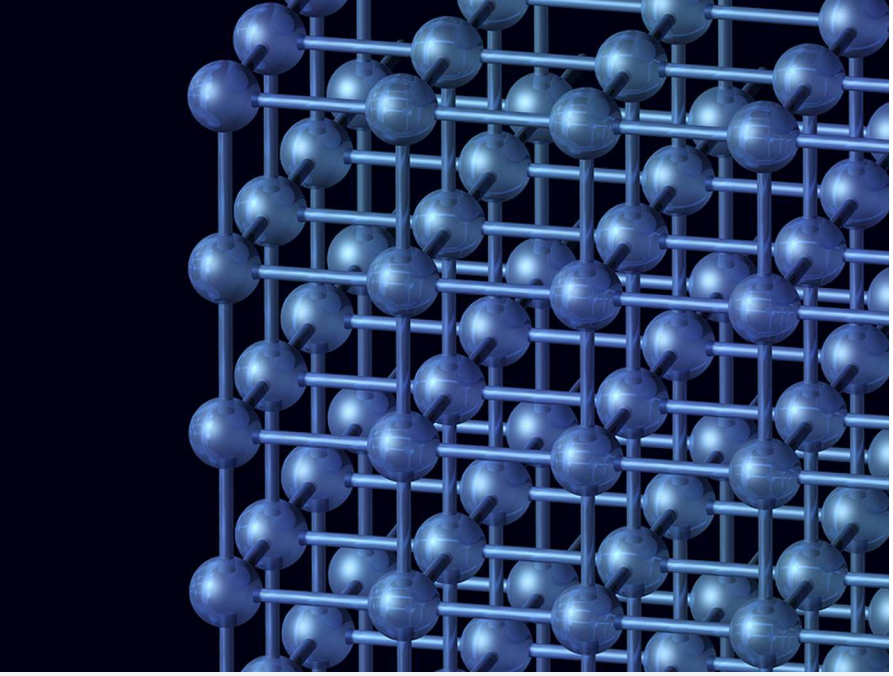


National Aeronautics and Space Administration

Manufacturing

Growth Method for Chalcongenide Phase-Change Nanostructures

Growing one-dimensional (1-D) nanostructures

NASA has developed a cutting edge method for growing one-dimensional (1-D) phase change nanowires of Germanium-Antimony-Tellurium (GST) alloys and similar alloys. Materials engineering at the nanometer scale can provide smaller devices than those currently available. Recently, 1-D nanostructures, such as wires, rods, belts, and tubes, have become the focal point of research in nanotechnology due to their fascinating properties. These properties are intrinsically associated with low dimensionality and small diameters, which may lead to unique applications in various nanoscale devices. It is generally accepted that 1-D nanostructures provide an excellent test ground for understanding the dependence of physical, electrical, thermal, optical, and mechanical properties on material dimensionality and physical size. In particular, 1-D semiconductor nanostructures, which exhibit different properties as compared with their bulk or thin film counterpart, have shown great potential in future nanoelectronics applications in data storage, computing, and sensing devices.

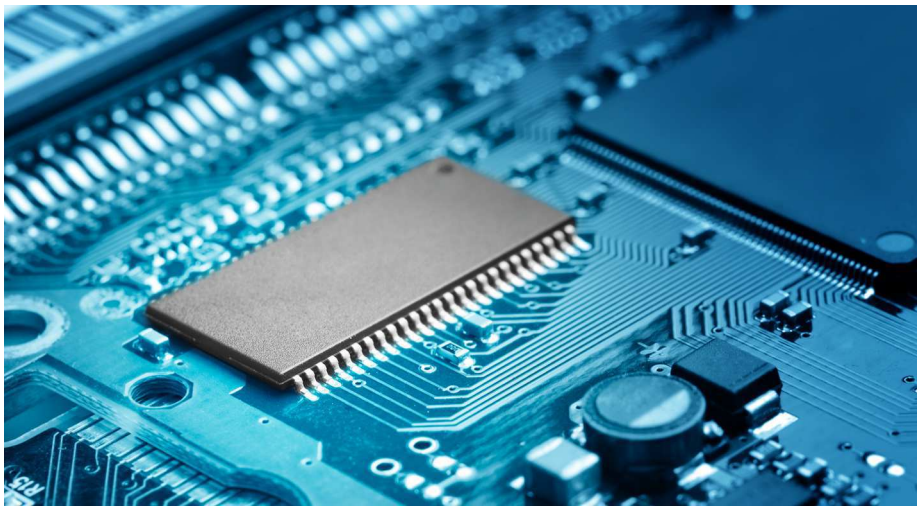
BENEFITS

- High-purity alloy nanostructures
- Nanowires, nanorods, nanobelts, nanotubes, & nanoelectronics growth in large quantities
- Increased data storage
- Decreased size of computing and sensing devices
- Low melt temperature
- Improved endurance
- Simpler fabrication
- Faster write/read

technology solution

THE TECHNOLOGY

The present invention provides a method for producing large quantities of 1-D nanostructures, such as nanowires and nanorods, of Ge-Sb-Te (GST) alloys and similar alloys from compounds such as GeTe and Sb2 Te3, or Ge, Te and Sb element powders on any kind of substrates, using a thin film or nanoparticles of at least one of Au, Ni, Ti, Cr, In, Sb, Ge and Te as a growth catalyst. Phase-change materials ("PCMs") are among the most promising media for nonvolatile, re-writable, and highly durable data storage applications. Phase change materials (PCMs) based on the Ge-Sb-Te multi-element alloy system have been extensively studied and have been found to be suitable for electrical memories. Among these alloys, Ge2Sb2 Te5 ("GST") exhibits the one of the best performance when used in a phase change random access nonvolatile memory (PRAM), for speed and stability. PCMs are among the most promising media for nonvolatile, re-writable, and highly durable data storage applications.



This technology has great potential in future nanoelectronics applications in data storage, computing, and sensing devices.

APPLICATIONS

The technology has several potential applications:

- Nanoscale devices
- Nanoelectric applications in: Data storage Computing Sensors

PUBLICATIONS

Patent No: 7,655,497

More Information

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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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