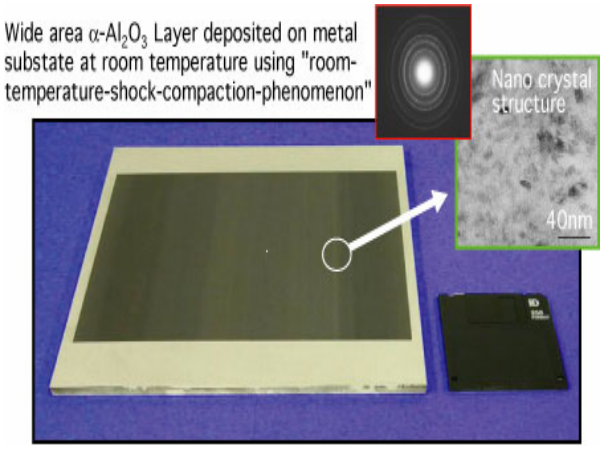
FIRST PRINCIPALS
Technology Transfer & Commercialization

POWDER FORMING & COMPACTION



The Opportunity

The Advanced Manufacturing Research Institute (AMRI) of the National Institute of Advanced Industrial Science and Technology (AIST) has successfully compacted α-Al2O3 fine powder on a metal substrate at room temperature **without binder or firing with heat**.

The Aerosol Deposition (AD) method enables formation of a uniform and thick ceramic layer useful in a variety of electronics applications.

Process & Product Applications

The AD process provides a clean, new surface, formed on site. Mechanical force is used to adhere the particles into a film or other shaped body. Resulting micro structures are of high density and high strength, formed without heating. The process provides very rigidly shaped objects with densities of up to 97% and adhesion force of 15 MPa. Applications include:

- Piezoelectrics (e.g. Lead zirconate titanate oxide; PZT) on silicon.
- Fully-dense nanocrystalline barium titanate with 40% higher permittivity than same material prepared by classic techniques.
- Low temperature AD enables compaction of ceramics on plastics and other novel substrates previously thought to be usable.

Intellectual Property

The primary patent protecting the technology is US **6,531,187** by Dr. Jun Akedo:

Features
• Method of forming a shaped body of brittle ultra fine particles with mechanical impact force and without heating.
• Enables application of ultra fine particles of ceramics to a surface by mixing with carrier gas and blowing the gas toward a substrate.

Organizational Capabilities

AIST (National Institute of Advanced Industrial Science and Technology) is Japan's extensive public research organization established in 2001. AIST is comprised of more than 50 autonomous research units and employs about 2500 research scientists and well over 3000 visiting scientists.

For More Information

AIST is seeking to license this technology and will provide assistance with its commercialization success to qualified organizations.

Certain circumstances will warrant consideration for nominal funding from AIST.

➢ ***Additional patents available include:***

6,991,515	Application of micro-particles in extremely smooth films of uniform density. Particles may be ceramic, metal, or other materials of about 1 micron in size. Related to **6,827,634**.
6,827,634	Ultra fine particle film forming ensures particles are sufficiently bonded together and planarized on the substrate. Related to **6,991,515**.
6,294,224	Arranging micro-sized, non-magnetic particles (e.g. diamonds for precise micro-grinding applications) by coating with magnetic fluid and precisely locating them by applying a uniform, magnetic field.
6,280,802	Formation of a film of ultrafine particles using a high-speed, high-energy beam. Produces films of superior density and adhesion.
5,805,971	Method of producing highly-precise, three-dimensional forms through multi-layer deposition technique.
5,424,834	Optical displacement sensor for measurement of shape and coarseness of a target workpiece surface. Provides high-sensitivity and high precision, unaffected by the target surface inclination.
5,368,898	Provides micro-topography on a surface by use of a magnetic fluid. Useful for fabricating surface roughness master specimens, various types of holographic optical elements, master optical disks, and diffraction gratings, as well as for micromachining.

AIST Home Page:

www.aist.go.jp/aist_e/about_aist/index.html.

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