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very small **particle** company **profile**



About Us

Very Small Particle Company Pty Ltd (VSPC) is an Australian-owned materials technology company that designs and manufactures complex metal oxides.

VSPC has developed a new process which ensures greater homogeneity, performance and product quality. As our name suggests, the materials we produce have nanometre-sized grains. The combination of complexity and nano-sized grains makes our powder products unique.

Unlike many other 'nanotechnology' companies, VSPC's manufacturing process has been designed and engineered to meet the demands of large-scale industry. This gives us the ability to provide a wide range of advanced metal oxides to customers throughout the world.

Given our expertise and experience, VSPC can also assist customers to develop new materials for superior performance. In particular, we are committed to technologies that promote a cleaner environment.

The Process

VSPC's processing method comprises four basic steps: mixing, reaction, heat treatment and milling. Each of these steps must be carefully controlled to:

- 1) preserve near atomic-scale mixing of the different elements,
- 2) deliver nano-scale grains, and
- 3) obtain very high surface areas.

Our new approach challenges the perception that nano-scale materials are expensive and only available in small quantities. By removing these restrictions, we are transforming nano-materials into commodities for large-scale industry.

Our process is highly generic. It has been proven for compounds used in applications such as solid oxide fuel cells, high temperature superconductors, vehicle emission control, batteries and fluorescent materials.

The flexibility of our process allows us to tailor-make products in terms of composition, purity, particle size, and surface area.

VSPC is ideally suited to fast-track development of new complex oxide materials. For new products with potentially high demand, we can enter into joint development arrangements with end-user companies.





Applications

Many of today's high technology products are based on complex metal oxides. Batteries, superconductors, vehicle emission control, solid oxide fuel cells, catalysts and phosphors are but a handful of areas in which these materials have applications.

Products prepared from nano-scale complex metal oxides typically display enhanced physical, electrical, optical and mechanical properties, compared to single metal oxides.

For example, it has been shown that complex CeO_2 based oxides and complex perovskites can deliver considerable benefits such as improved catalytic performance with reduced amounts of expensive platinum group metals.

Another example is perovskite membrane technology, which is at the heart of solid oxide fuel cells and the cost efficient conversion of syngas to liquid fuels.

Example

$\text{Ce}_w\text{Zr}_x\text{Y}_y\text{O}_z$ (surface area $\sim 300 \text{ m}^2/\text{g}$, grain size 5-10 nm) is an example compound that shows VSPC's ability to introduce complexity in composition (if required, more than 5 metallic elements can be introduced).

Our powder compounds typically display nano-crystalline grains and high surface areas.

VSPC has a unique capacity to further tailor compounds for use in specific applications. We also have skills and experience in shaping compounds into different forms. Working co-operatively, we can provide you with materials that meet your specifications and give you a leading edge.

We are continuously expanding our capabilities and producing a wider range of advanced metal oxides. Please visit our web site www.vspc.com to view our range of products and services.

Technical Capabilities

VSPC has extensive experience in design, manufacture and supply of advanced materials. This experience spans the full spectrum of development, from initial research to pilot and large-scale production.

Our production equipment has been designed and engineered to meet demand from a few kilograms to tonnes of material. Importantly, the flexibility offered by our generic process is preserved. This enables us to rapidly adapt our manufacturing technology to meet specific customer requirements.

We use a wide range of advanced testing techniques including atomic absorption spectroscopy, X-ray diffractometry, optical microscopy, particle sizing, surface area measurement, thermal analysis, carbon analysis and electron microscopy.

In order to provide industry with outstanding customer service, we have assembled a multi-disciplinary team of individuals with extensive experience in analytical and processing techniques.

Our quality systems, people and equipment combine to ensure that our customers receive a premium product.





