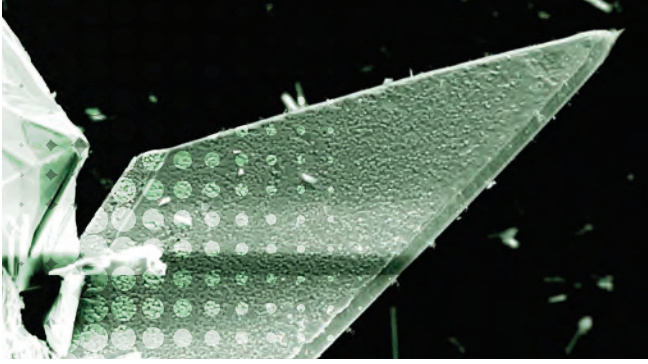
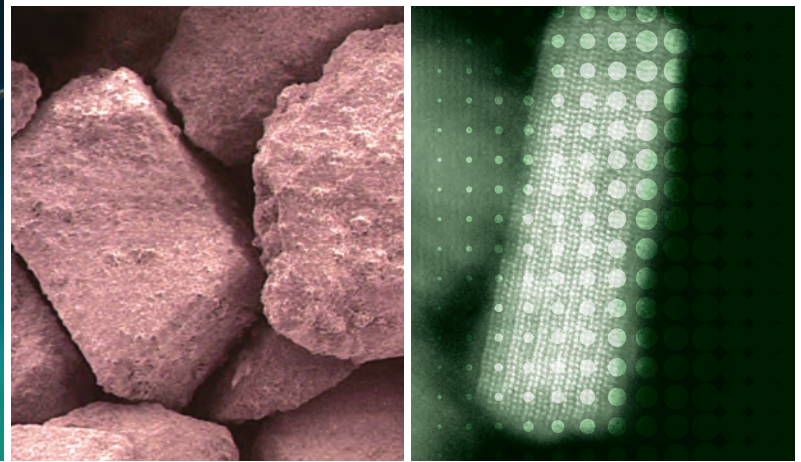


# POWDERMET<sup>INC.</sup>

MAKING MATERIALS DO MORE



A nationally-recognized leader in nanotechnology and advanced materials research, ready to provide your business with the breakthrough technology needed to achieve market leadership today.





# Company Overview

## Background

Powdermet has over twenty years of experience of **making materials do more™**—creating dramatically innovative nano-engineered products for both government and private industry.

With research investment of nearly \$50 million, Powdermet has earned three R&D 100 Awards, has received dozens of patents and has broken nine different materials science property records—covering the gamut from areas such as energy storage density to ceramic fracture toughness.

Powdermet developments include dramatic advancements in anode nanomaterials, cutting tools, battery technology, armor systems and thermal spray powders—just to name a few.

In turn we have commercially launched 18 trademarked materials. Powdermet has also been named to the Inc.5000 list twice (most recently in 2016), and has served as the platform to launch eleven new companies.

## Capabilities

Powdermet has achieved success thanks to an organization made up of some of the top material science researchers in the industry, addressing a broad range of technology fronts.

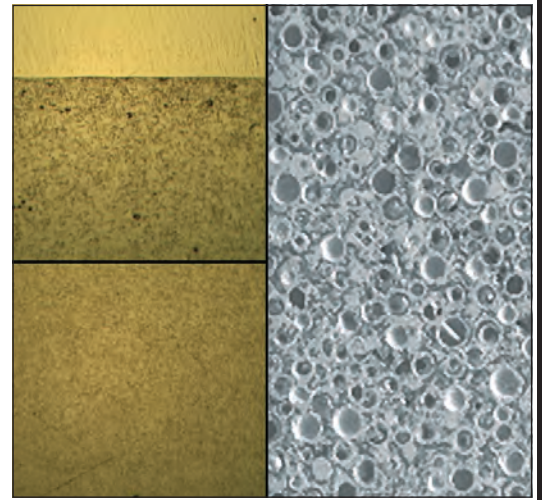
Powdermet has also uniquely positioned our operation so that we can achieve mid-scale prototyping—allowing us to avoid the prohibitive costs of full-scale production while also being able to fulfill volume demands for pre-production materials in a manner that typical university prototyping facilities cannot.

Our expertise includes the creation and manufacturing of light metal composites, advanced coating technologies, powder metallurgy, energetic nanocomposites, unique down-hole pumpable technologies, and engineered micro-nanocomposite metals.

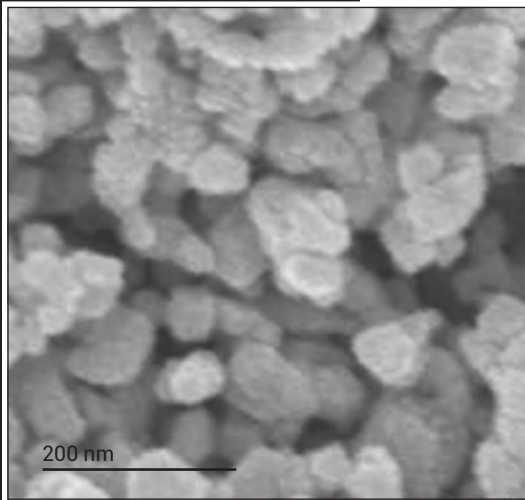
Located in Euclid, Ohio, our state-of-the-art research and development facility allows us to provide a broad range of industries with development, simulation and testing, prototyping, and pilot manufacturing of market-changing technologies.

## Meeting Your Needs

With our unique background and experience, along with a diverse spectrum of material science expertise, Powdermet represents your very best option as a partner to create the innovation you need to assure your business differentiation and success.



# Platform Technologies



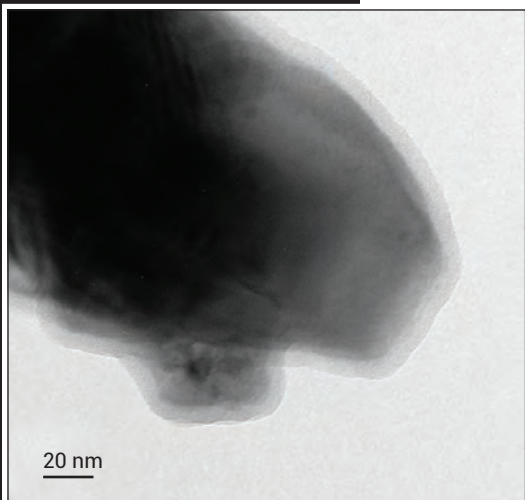
## Nanoparticle Synthesis

Thanks to years of experience and superior technology, Powdermet can process metal and ceramic (oxide and non-oxide) particles down to 20nm in non-agglomerated, controlled particle size distributions. Utilizing top-down methods with a high energy ball mill, we have successfully fabricated barium titanate and calcium copper titanate nanoparticles to 20-50 nanometers. Additionally Powdermet has produced aluminum as fine as 100 nanometers, 50-100 nanometer titanium diboride and nano-tungsten as fine as 20 nanometers. Powdermet is able to cite these remarkable capabilities thanks in great part to our ability to control and fully understand the chemical kinetics that allow for the scalable production of high quality powders.



## Composite Fabrication

Powdermet uses its micro- and nano-particle and coating technologies to develop and deliver next level state-of-the-art composite materials. Composite fabrication is one of the most widely used design tools for incorporating adaptability for a substrate to different situations—through the intimate combination of materials to serve specific purposes and impart improved properties. Powdermet has been distinguished time and again for creating microengineered “composites that do more”. Our technologies include lightweight syntactic composites, thermal insulating composites, energy storage composites, reinforced fiber composites, and also unique composites which feature high surface hardness, radiation shielding and more.



## Coating and Encapsulation Technologies

Powdermet has an impressive portfolio of coating and encapsulation technologies to draw from in order to provide toll processing for encapsulating a broad range of materials, utilizing our unique fluidized bed chemical deposition (FBCVD) technology, as well as our sol-gel and hydrometallurgy processes. We can process a range of materials as small as 100 nanometer yet maintain a controlled coating thickness. Powdermet provides research and development and toll coating services to a variety of industries across a wide array of material platforms. The transmission electron microscopy (TEM) image to the left shows the consistency of our encapsulation across the entire surface of this particle (8.3 nm, which is small enough that over 10,000 of these would fit on the diameter of a human hair).





# Choosing the Right Technology Resource

A great many issues come into play when choosing the resource you want on your team for developing the technology that will differentiate your business for the future.

Powdermet has not only a vast wealth of experience to draw upon, but also the leading minds in material science research to assure that you will not only receive sound, reliable support, but also innovation that most likely cannot be achieved with any other resource in the market today.

**Contact us** - together we can not only solve your material challenges today, we can see that you are well positioned to address them for years to come.



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