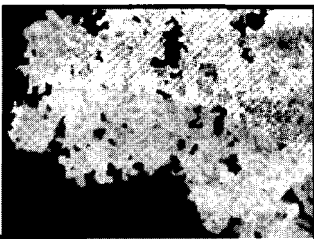


## Nanoscale Powders Studied

AP Materials, Inc., St. Louis, Missouri, received three Phase I Small Business Innovation Research (SBIR) contracts from the U.S. Missile Defense Agency, Department of Defense, to develop nanoscale aluminum, tantalum and titanium diboride powders, reported Douglas DuFaux, vice president of operations. Each contract is for six months and worth \$70,000.

Tantalum powders will be developed for advanced electronic capacitors to increase capacitor efficiency and provide further miniaturization of passive electronic components.

The aluminum powder award goes to developing powders for solid rocket fuels that may improve the performance of missile and space vehicle launches by providing for additional payload or enabling the production of smaller systems. Nanoscale powders



Nanoscale powders studied.

have a higher specific surface area than conventional powders and will ignite faster and cause a more even burn of the rocket fuel. AeroChem Research Laboratory, Titan Systems Corp., is providing combustion testing and interpretation.

AP is studying Nanoscale titanium diboride for

advanced batteries and other energy storage applications. "The award was made possible in-part by our partnership with Millennium Cell, a development-stage company that has created a proprietary technology to safely generate and store hydrogen," DuFaux said.

Established in 1997, AP Materials produces composite powders via a proprietary gas phase sodium reduction process. Nanocrystalline powders are protected from oxidation by encapsulating the particles. The company makes nanoscale powders in the range of 5nm – 500nm.

For further information contact AP Materials, Inc., 4041 Forest Park Avenue, St. Louis, MO 63108; [www.apmaterials.com](http://www.apmaterials.com)

## Fortifying Food

SUSTAIN (Sharing United States Technology to Aid in the Improvement of Nutrition), Washington, DC, is evaluating elemental iron powders (reduced, electrolytic and carbonyl) for food fortification programs. Researchers are investigating what powder characteristics influence bioavailability or how well iron is absorbed during digestion. About \$1 million has been allocated for studies at US and European laboratories, reports Elizabeth Turner, executive director.

In collaboration with SUSTAIN, researchers in Mexico, at the U.S. Food and Drug Administration (FDA) and Iowa State University have studied iron powder in corn masa flour using in vitro dialysis and caco-2 cell screening tests. A more extensive series of screening tests is underway currently at Cornell University, Penn State University, the U.S. Department of Agriculture — Ag Research Service, and Sahlgren University Hospital in Sweden. In these tests,

iron powders will be evaluated for bioavailability through solubility, dialysis, caco-2 cell, rat assays and human plasma tolerance curve methods. Screening test results are expected by the end of 2002. The most promising powders will then be evaluated in a human study carried out in mildly iron deficient volunteers.

The bioavailability of elemental iron powders will be ranked against monohydrate ferrous sulfate, the standard to which iron fortificants are compared. However, the high reactivity of ferrous sulfate offers problems such as color changes and rancidity in food. Ferrous fumarate also has a high bioavailability rating. Iron powders cause the fewest problems with color, flavor or storage of fortified food.

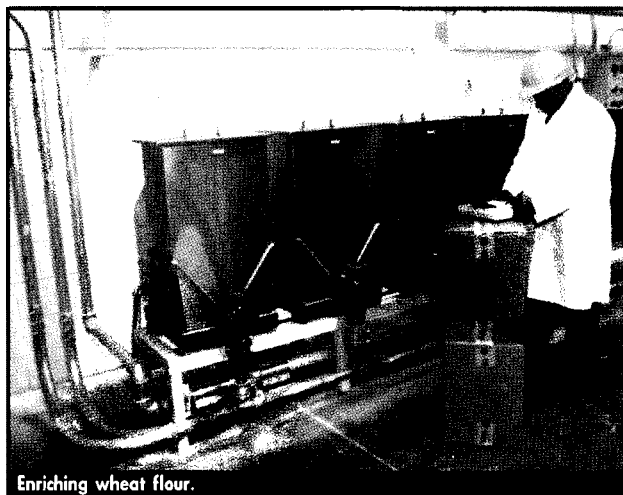
The following companies are supplying powders for the study: OMG Americas, QMP, North American Hogan, ISP, BASF and Industrial Metal Powders in India.

SUSTAIN is a non-profit organization incorporated in 1996 to improve health in developing countries by partnering with industry to improve the nutritional quality and safety of foods. Turner reports that iron deficiency anemia (IDA) is the most prevalent nutritional disorder in the world, particularly among women and children. The World Health Organization estimates that 50% of children, 42% of woman and 26% of men are affected by IDA in developing countries.

In May 2001 SUSTAIN published "Guidelines for Iron Fortification of Cereal Food Staples." Iron fortificants are used in milled and refined cereals and wheat and corn flour for bread, semolina, tortillas and rice. The organization receives financial support from public-sector donors and private groups such as the Bill & Melinda Gates Foundation.

American Ingredients Company, Kansas City, Missouri, a wholesale bakery ingredient supplier is the largest U.S. supplier of vitamin and mineral enrichments for flour and cereal. It buys mostly hydrogen reduced iron powder, but also uses electrolytic iron. Total U.S. consumption of iron powder for iron-enriched foods exceeds 2 million lb (0.91 million kg) annually, reports Ian Trood, general manager, flour service division. Flour is also enriched with zinc oxide powder, but mostly for markets in Mexico and Asia.

For further information contact Elizabeth Turner, executive director, SUSTAIN, 1400 16th Street, NW, Box 25, Washington, DC 20036; [www.sustaintech.org](http://www.sustaintech.org).



Enriching wheat flour.