Federal grant invests in nanostructured 'super' materials

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Backed by a $1.2 million federal grant, the University of Wisconsin-Milwaukee (UWM) has launched a Center for Advanced Materials Manufacturing (CAMM) that will support the transfer of UWM research in bulk nanostructured materials to manufacturing industry in both Wisconsin and the nation.

These futuristic metallic materials hold the potential to revitalize foundries and metal-casting businesses if they can be mass-produced.

CAMM researchers will work with Oshkosh Corporation and other companies to develop an infrastructure for scaling up the production of these revolutionary materials, which could become the new mainstay product of the region's old-economy foundries.

Nanostructured metallic materials are embedded with atomic-scale particles that make them cheaper, lighter and stronger than the original metal alloys. They also deliver high-performance qualities such as self-lubrication and energy-absorption. For example, nanostructured aluminum can be 10 times stronger than conventional aluminum alloys.

"This project falls in line with the university's goal of passing on its research discoveries to the region's businesses in order to fortify the state's economy," says Michael Lovell, dean of UWM's College of Engineering & Applied Science. "The new center will collaborate with more than a dozen businesses from around the Midwest interested in generating these new materials that have so many applications."

"As a major supplier of tactical-wheeled vehicles for the Department of Defense, we must satisfy transportability, safety, energy-efficiency and cost-effectiveness goals," says Robert Hathaway, vice president of materials and process engineering for Oshkosh Corp. "The facility and faculty improvements made by UW-Milwaukee will greatly enhance our collaborative efforts in lightweight materials, vehicle human factors and manufacturing ergonomics."

The materials were developed by CAMM with federal support from the last several years, including appropriations requested by both Sen. Herb Kohl and Rep. Gwen Moore, and funding from the U.S. Army Research Laboratory and Tank-automotive and Armaments Command (TACOM). The materials meet the Army's need for heavy-duty vehicles that can be airlifted and operate for prolonged periods before refueling.

Production of bulk nanostructured materials can help sagging foundries diversify their business because they can be made using conventional metal-casting techniques, says Pradeep Rohatgi, a UWM Distinguished Professor, AAAS fellow, and director of CAMM.

"Foundries could start making these modern products without having to update their equipment," says Rohatgi. "CAMM will also educate students and help train industry workers in the manufacturing of high-tech materials for civilian and defense sectors."

Metals and metal composites represent the largest volume of materials produced in Wisconsin and the state's foundry industry alone employs 21,000 people.

In addition to studying the large-scale production of these materials, CAMM scientists are working on simulation software and impact/fracture modeling to optimize the manufacture of nanostructured materials. Researchers also are developing software that helps

manufacturers model reinforcing composite materials, such as carbon or glass fibers, for high-strength, low-weight products.

Provided by University of Wisconsin - Milwaukee

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