

By Aaron Corvin

Metal of the Future?

A start-up attempts a nano-level revolution to transform military and civilian life



John Whitaker and Christina Lomasney (above) co-founded Modumetal Inc., a year-old Seattle start-up aiming to revolutionize the production and use of metals for military and civilian use.

"Modumetalized" foam material (right), shown in different magnifications, shows the metal alloys that have been laminated onto the foam surface.

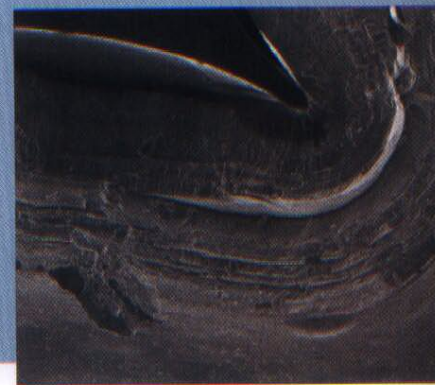


NANOTECHNOLOGY, the science of manipulating matter at the molecular and atomic scales, is bringing revolutionary changes to the world of electronics. Now a Seattle-based team of scientists, engineers and venture capitalists believes their year-old start-up company, Modumetal Inc., will use the technology to revolutionize a process that hasn't changed much since the industrial revolution – the production and use of metals. The company believes it can produce materials that are substantially lighter and stronger than steel.

If successful, the 11-member company could save lives by replacing the traditional protective body and vehicle armor used by the military with a lighter, more durable metal. In fact, putting the metal to work for the military is Modumetal's immediate goal as the United States struggles in Iraq to defend against sophisticated instruments of asymmetrical warfare and improvised explosive devices.

"We're working every day to develop a system that can help alleviate that problem," says Christina Lomasney, co-founder, president and CEO of Modumetal, who has a personal stake in the potential military applications: Two of her five brothers serve in the U.S. Marine Corps.

Meanwhile, the broader commercial ap



cations are tantalizing. The metal the company is developing could be used in everything from cars and airplanes to garage tools and household products, infusing them with lighter and more durable properties, extending their shelf life and saving on a variety of costs, including fuel. Imagine making your own bold geopolitical statement by driving an SUV that is vastly lighter and sturdier than current models, and therefore conserves more fuel, treads lightly on the earth and is much safer to drive.

Modumetal uses a computer-controlled process to "grow" hunks of metal from the ground up. That enables it to make the same piece of metal harder in one area and softer in another area, depending on the particular characteristic best suited to that purpose. Using such metals in car doors and hoods, for example, would have certain advantages over traditional homogeneous steel, because the metals could be modified precisely to make them stiff in places where the car needs structural strength to protect the passenger, for example, and soft in areas where such flexibility might protect a pedestrian who is hit.

Defense contractors could design and build body armor and armored vehicles that are unusually lightweight and extremely tough. That would allow them to avoid trading the mobility of lighter materials for the durability of heavy materials. "Weight is a major concern right now," Lomasney says. "Humvees are not designed to carry the armor they're carrying." Body armor currently uses ceramic, a material that is lightweight and tough but also expensive and more likely to crack from multiple impacts.

The metal parts grown by the company incorporate different kinds of materials, such as iron and nickel, and are known as "nanolaminate" alloys. "It's metallic plywood," says John Whitaker, co-founder and chief technology officer for the company. "We don't use wood; we use metal. We can have hundreds of thousands of plies."

The company has secured \$800,000 in financing from the Seattle venture firm Second Avenue Partners and angel investors, and retired Marine Corps Lt. Gen. Carol Mutter has joined the company's advisory board. Moreover, the research arm of the Defense

Department, the Defense Advanced Research Projects Agency, chose Modumetal to participate in its Armor Challenge, a program to develop armor systems that perform as well in ballistic tests as rolled homogeneous armor steel at half the weight.

Meanwhile, Modumetal helps boost the credibility of Washington state as it competes with places like Boston and Silicon Valley to become a nanotechnology leader. The University of Washington is home to the Center for Nanotechnology, launched in 1997. And the Fred Hutchinson Cancer Research Center, the Pacific Northwest National Laboratory in Richland and Boeing are all plowing ground in the field.

Daniel Schwartz is a professor of chemical engineering at UW and associate dean of new initiatives for the university's College of Engineering. He is familiar with Modumetal's work. In fact, Whitaker studied for his doctoral degree in Schwartz's chemical engineering lab. Schwartz says the "low-hanging fruit" in nanotechnology, such as manipulating particles to make cosmetics look and feel better, is being plucked. The high-hanging fruit, the complex, early-stage applications of nanotechnology in which you have to "build up into higher-order systems," he says, is what Modumetal is trying to pluck.

Modumetal's technology is patent pending. Company officials decline to discuss the specifics of the technology, when it might be ready for military or commercial applications, or how they invented it. But the idea began occupying Whitaker's mind in 2004 when he started thinking a lot about transportation — chiefly how to re-engineer metals to make vehicles more fuel-efficient and durable. His thinking was helped by the fact that he was brainstorming "armor solutions," as he describes it, in his work at Isotron, a polymer composites company co-founded by Lomasney that shares office space with Modumetal overlooking the Northlake Shipyard in Seattle.

Whitaker's doctoral studies in electrochemical printing at the UW further drove his mind in the right direction. Inside the offices of Modumetal, you quickly learn that ample minds, as well as bold entrepreneurship, are aggressively at work here.

Asked about how the company puts its metals to the test, Lomasney describes using an impact tester, an instrument that is basically a big anvil. "We're chopping nanolaminates," she says. Her white lab coat, the front

*Celebrating
70 years*

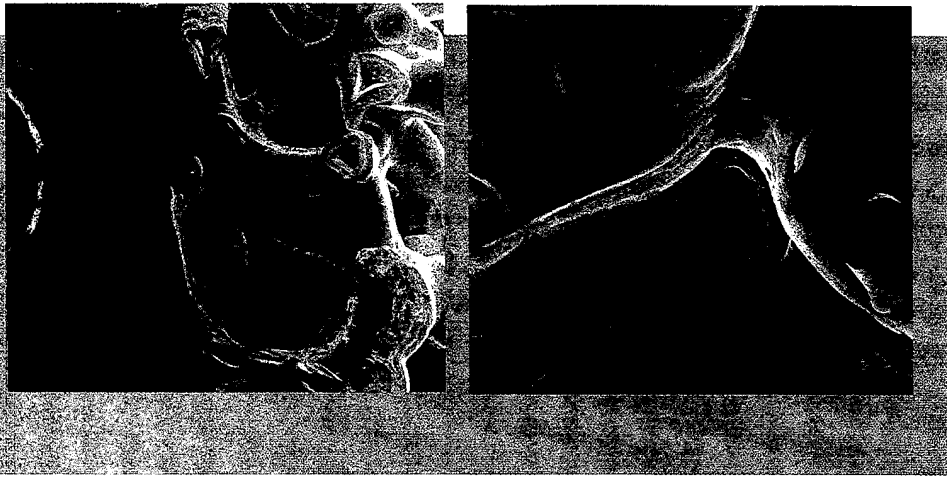
of delivering insurance and
risk management advice crafted
to meet the unique needs of
Northwest business and industry.

WASHINGTON'S
100 * BEST
COMPANIES
TO WORK FOR 2007

PARKER | SMITH | FEEK

INSURANCE • BONDS • EMPLOYEE BENEFITS

2233 112th Ave. N.E.
Bellevue, WA 98004
425.709.3600
www.psfinc.com



of which looks like the beginning of a Jackson Pollock painting, spattered in hues of gray, green and black, hangs on a hook near her desk.

Lomasney's experience in science, business and management is rich. She has a bachelor's degree in physics from the UW (and continues graduate work there). She was a nuclear industry researcher, who worked on the Chernobyl cleanup in the mid-1990s. She also worked as a project engineer at The Boeing Co. from 1996 to 1999. She co-founded Isotron in Seattle in 2001.

As Lomasney sees it, one of her primary missions at Modumetal is to "hire people

who are smarter than I am, which is easy." The company's staff of 11 includes a mechanical engineer, a chemist, a metallurgist and a structural physicist. "I get to ask the really hard questions," she says.

Lomasney, who grew up in New Orleans, thought like a businessperson early on. At 13, she masterminded a plan to start a babysitting business. Why, she thought, should she and her fellow neighborhood babysitters each care for one child when they could team up, baby-sit more children, charge by the hour and reduce their overhead costs? Suffice it to say, the other girls flaked out. Lomasney, though, looked after

three children that summer.

It's that kind of drive and energy and thinking that now spurs Lomasney to make Modumetal successful. Pete Higgins, a partner with Second Avenue Partners, one of Modumetal's investors, says the potential of the company's technology is "immense" and that Lomasney, Whitaker and their team are experienced, smart and enthusiastic about their work.

It's a team, he says, that's built on more than just a good idea, because they "challenge each other and listen to each other."

Lomasney knows that it will take time to achieve the company's goal of revolutionizing the production and use of metals, to fully exploit the principles of nanotechnology to produce a lightweight metal, unmatched in durability by steel and ready to transform military and civilian life. For her, it is only a matter of time. "We're in a very new field," Lomasney says, but "the issue is not 'Is it going to work?' It's 'How long is it going to take?'"

Aaron Corvin is a senior writer at Washington CEO Magazine.

**INDOOR RACING
EXCITEMENT!**

**CORPORATE EVENTS
BIRTHDAY PARTIES
ARRIVE & DRIVE**

**1-888-K1 KARTS
K1SPEED.com**

CARLSBAD IRVINE ONTARIO ANAHEIM SEATTLE

Think. Plan. Build.

Fast-track retail centers.

Kimball Creek Village, Snoqualmie (photo by Aaron Leitz)

The challenge?
Accelerate the phased construction schedule of suburban retail center to meet client's changing needs. While working successfully with design team and city officials to expedite the project and get it open for business.

The solution? GLY

Find out more about our flexible, client-based approach to retail construction on our NEW website gly.com.