UCF scientist enjoys work with 'disruptive' ceramic material

Bill Easter is a scientist and entrepreneur in Central Florida whose passion is to develop cutting-edge, industrial materials. (Kevin Spear/Ostaff)

By Kevin Spear Staff Writer

Bill Easter's hobby and profession is high-end tinkering with industrial ingredients; he's a "materials guy" with dozens of patents in his name and generous support from NASA.

Easter has been captivated lately by an obscure material that even Easter had not appreciated initially: "polymer-derived ceramic."

Stirred and baked in his laboratory, the stuff shows promise to outperform metals and plastics, and significantly improve cars, computerized devices and other manufactured goods, he thinks.

"I love materials," said Easter, 61, in an energetic talk about scientists, commodity pricing and the "golden age" of materials, all for a point.

He needs help, as scientists routinely do, ushering his discovery from his lab, at UCF's Business Incubation Program at Central Florida Research Park, to an assembly line.

Spacecraft heat shields, high-end brake disks, turbine blades in power plants and bulletproof vests are some of the places where ceramics are put to work. At home, cutlery has arrived made of stay-sharp ceramic.

But ceramics often are pricey: Easter's goal is high performance at low cost. The particular ceramic he has in mind he held up as if it was a hamburger patty.

The object was black, squared off and granular. In his grasp and view, the crude ingot is startlingly unique, readily manufactured and poised to rock the materials industry.

"It's magic," he said, searching to convey his enthusiasm for properties of a material he formulated about a year ago, doesn't fully understand and doesn't have a name for that's more catchy than "coal-core composite."

"As a scientist and engineer, one shouldn't use the word magic but there are some interesting things that need to be studied," Easter said.

Touring his lab of bubbling liquids and bizarre containers, he explained that seeking investors is not for pretenders. But if Easter is deferential, he is not a newbie.

He got a geology degree at the University of Texas; a degree in chemical engineering at Drexel; and a master's in engineering sciences at Penn State.

For 17 years, Easter worked at AT&T and Bell Labs in microelectronics.

Then, 16 years ago, he founded Semplastics, a company based in Oviedo, now with eight employees. Most are scientists and engineers.

Semplastics' "precision plastic engineered components" has been his bread and butter. Buyers are semiconductor, medical, aerospace and petroleum companies.

But in 2012, NASA disclosed that new space telescopes will need mirrors comprised of a material that is more stable, lightweight and affordable. It was a clarion challenge for Easter. He responded by branching Semplastics into X-MAT, a business line based on polymer-derived ceramic.

Ceramics are manufactured in a variety of ways.

X-MAT's process heats liquid resin (an ingredient of some plastics) into a wafer of soft, white plastic, which is further heated into a ceramic as thick as an inch and with potential to be thicker.

"I've got guys with PhDs, guys with master's … they'd go 'Bill, what did you add to this to get this?'" Easter said, lifting a vial of clear resin and then blackened ceramic. "And I said 'I apologize profusely, I am such a poor communicator.'"

Easter pressed on with a materials guy's dialect to clear up confusion.

"There's organic and inorganics. There's silica, oxygen, carbon hiding in here," he said, pointing to the vial. "Along with methyls and all kinds of hydrogens, and those are driven out by heat."

That may be incomprehensible to many, but NASA translated it into grants to Semplastics of $125,000 two years ago and $750,000 last year.

The reason: Easter had manipulated polymer-derived ceramic into a shape, thickness and honeycomb for space mirrors.

X-MAT also had become a vehicle ready to be tricked out.

"The materials world is exploding; we are in a materials revolution," Easter said. Much of the excitement, he added, is in adding ingredients to the soup of ceramics manufacturing to make a "composite."

Ideal composites, he said, offer the best of plastic, steel and ceramics: they are super materials.

Easter began to experiment about a year ago with blending finely powdered coal with polymer-derived ceramic.

The coal wasn't intended as filler; Easter was hoping for chemical bonding. What he got – the coal-core composite – dazzles but puzzles him.

The composite is lighter than X-MAT ceramic and it conducts electricity, all while sharing the original ceramic's other qualities.

The new material has intrigued oil drillers, wanting to know if it could outperform other materials used to fracture petroleum-soaked geology.

But Easter sees far bigger potential for electronics, transportation, fire barriers (it doesn't burn) and more.

The most significant factor may be the bottom line. Mined by the billions of tons, coal is less costly by an order of magnitude than plastic and metal.

"If you're in a position where you can take coal and coal composites and have the potential to be cheaper than polypropylene or aluminum, then you have a very disruptive technology," Easter said.

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