



Cluster Klatch

The Greater Richmond region has the makings of a world-class center for high-performance fibers. What it has lacked is a forum to build relationships and exchange ideas. That will change on Jan. 18.

by James A. Bacon

Imagine a day in the not-so-distant future when scientific progress makes it possible to customize advanced materials with the specific properties that a manufacturer needs for high-performance products... new fibers and films that are super strong, ultra light or phenomenally heat-resistant... materials that stand up to abrasion, vibration fatigue and ultra-violet light ... sensor-embedded fabrics and laminates that respond to changes in temperature or touch.

Think of the myriad of ways that such extraordinary materials could be applied: from extreme sports gear to body armor for the "warrior of the future," from critical parts inside automobile engines to mission-critical components on spacecraft bound for the moon. Then, imagine that the global center of innovation for this emerging industry was Richmond, Va.

Visualize Richmond as a center for world-class research. Picture a place where manufacturing giants serving international markets spin off new ventures to exploit promising new technologies, where venture capitalists fund entrepreneurs with imaginative new applications. Imagine

Richmond as the axis of ideas, the locus of intellectual capital and business intelligence, the destination of scientists converging for world-renowned conferences and symposia.

Richmond is not there yet, not even close. But such a future is not too far-fetched to contemplate, even though it may be a generation away. If Richmonders are willing to take a long-term view, as, say, the proponents of the Research Triangle did in North Carolina three decades ago, we have the power to make it come true.

The computer industry has its Silicon Valley, and biotech has its Boston. But no region in the United States has emerged as the epicenter of innovation in advanced materials. Manufacturing and R&D in plastics, ceramics, polymers, specialty chemicals and nanotechnology are scattered widely. While many communities seek to build biotech and information-technology clusters, none have mobilized their resources around high-performance materials. The field is wide open – there are no entrenched competitors to dislodge.

Aspiring to world-class status in a technology field may strike most Richmonders as a tad ambitious, but it's a conversation

that we at the Greater Richmond Partnership would like to start. We are holding a cocktail party and reception at the Courtyard Marriott, 2001 West Hundred Road, Chester, on January 18 at 5:30 PM. Anyone with an interest in the idea – manufacturers, engineers, scientists, financiers, entrepreneurs, inventors – is encouraged to attend. (For more information contact Jocelynn Castro at (804) 643-3227.)

"In the bid to build a world-leading advanced-materials cluster, Richmond has a big head start over most regions," declares Gene Winter, senior vice president of the Greater Richmond Partnership, the economic development organization for the Richmond region. "Richmond is home to brand name fibers like Kevlar and Spectra, and we're incubating the next generation super-fiber, M5. We have strong manufacturing expertise in polymer fibers and a growing R&D capability."

- Winter sees several things the community can do to support the building of a powerful industry cluster. "First," he says, "is building local awareness that the makings of a world-class industry cluster even exists." Other potential initiatives include:
- Organizing an international conference on high-performance materials that highlights world-class scientific research and global market trends. Establishing a university-backed research institute that conducts basic research in fields of interest

to local industry players and, perhaps, operates laboratory equipment and testing services that otherwise would be too expensive for local companies to maintain in-house.

- Focusing economic development recruiting efforts on companies in the advanced-materials supply chain: from value-added suppliers such as fabric weavers to end users such as manufacturers of body armor.

"Incredible innovation is taking place here at many levels, including R&D, new product development and manufacturing process," Winter says. "Our hope is to increase the pace of innovation by providing linkages between all the players. By increasing the flow of information and creating new relationships where there were none before, we think we can spark new business opportunities."

Longer range, Winter says, the Partnership would like to catalyze the building of support structures – laboratories, financial backing, intellectual property expertise, research institutions, and a supply of skilled workers – that will take the advanced materials industry cluster to the next level. "We have the basic capabilities," he says. "It's just a matter of lining them up so they complement one another."

Richmond is as logical a candidate as any region to seize the lead in advanced materials. The Greater Richmond region possesses many of the building blocks of a strong industry cluster in advanced materials. These include:

Global champions. The region is home to divisions of two For-

tune 500 companies: DuPont and Honeywell. DuPont conducts the R&D, manufacturing and product development for the Kevlar and Nomex super-fibers, and has recently acquired a majority interest in Magellan Systems, which has been developing the next-generation M5 super-fiber. Likewise, Honeywell conducts R&D, manufacturing and product development for its Spectra fiber. Both companies serve global markets.

Around these dominant players in polymer chemistry is arrayed a constellation of smaller companies. MGC Advanced Polymers, a subsidiary of Japan's Mitsubishi Gas Chemical, manufactures the MXD6 Nylon used in the food-packaging and automotive industries. Performance Fibers produces polyester fibers used in tires, seat belts, offshore mooring and other uses.

Other local chemical companies serve niche markets for specialty materials. Tredegar's Film Products unit modifies film surfaces to impart unique performance characteristics in personal, medical, landscaping, industrial, filtration and packaging applications. Eternal Technology, a Taiwan-based chemical company, produces photo-resist films. Carpenter Company Carpenter develops and manufactures polyurethane foam for a wide variety of applications. Alloy Polymers is a leading toll compounder of engineering thermoplastics and high-performance polypropylene compounds and alloys.

Supporting businesses. Essential to any strong business eco-system are support companies with specialty capabilities. These companies the Richmond region has in abundance. Richmond Fiber Systems provides purchasing and fiber/yarn winding services to the textile industry for such products as fiber

optic cable, sail cloth, structural composites and industrial fabrics. FloOnics specializes in the installation of ultra high purity systems used in high-tech and clean rooms. Similarly, AdvanceTEC designs and builds clean-rooms for the microelectronics, nano-tech and other sectors. Ethyl Corporation, just to pick one of many companies in the region, provides value-added manufacturing and supply solutions to the chemical industry.

Value-Added Resellers. Also part of any vibrant business ecosystem are companies that add value to upstream products like the high-performance fibers. For instance, in the Richmond region, DuPont-backed Xymid weaves fibers with different properties, from Kevlar to Spandex, to create fabrics with customized performance attributes. RBR Tactical Armor, a Richmond subsidiary of Scotland-based LBA International, manufactures body armor, helmets, armored plates and tactical accessories.

Consumers. To stay on the cutting edge of technology, businesses need to stay in close contact with the ultimate customer. Many consumers of high-performance materials are scattered across the country, but one giant—indeed, a customer that drives the entire industry—resides barely 100 miles away in Arlington County. The Department of Defense is a voracious consumer of the specialty fibers used in body armor, the up-armor of Humvees and even the armoring of helicopters. The desire for improved performance in aircraft, naval vessels and other weapons systems drives continued R&D. Critical to anyone playing in the advanced materials space is the ability to interact easily with Pentagon officials and the designers, like the Northrop Grumman shipyards in

Newport News, of major weapon systems.

Research. Every strong industry cluster has a strong university R&D component to its success. Here in Richmond, Virginia Commonwealth University has strong and growing departments in chemistry and chemical engineering. At the Engineering school, Dr. Kenneth Wynne recently won a "Creativity Award" from the National Science Foundation for discovering a new polymer with the unique property of becoming water repellent when wet. The material could be used to create micro-fluidic "intelligent switching" devices for a variety of applications.

Elsewhere in Virginia, Virginia Tech is conducting interesting research in the modeling and simulation of polymer structures, while the University of Virginia is making a major push in nano-technology. On the Virginia Peninsula, NASA Langley is developing adhesives, ceramics, plastics and metal alloys that make aircraft and spacecraft stronger, lighter, more durable and better able to withstand the harsh conditions of space. Nearby, at the Thomas Jefferson National Accelerator Facility, the Free-Electron Laser project is using light tuned to specific wavelengths to change the properties of polymer chemicals and the production of carbon nano-tubes.

Richmond has all the elements, but that doesn't guarantee that a fruitful interaction will occur. "Flour, eggs, milk and sugar don't make a cake unless you mix them together in the right sequence under the right conditions," says Winter. "For all assets we have, the advanced materials sector hasn't spontaneously generated its own forum where key players can interact, where serendipitous conversa-

tions occur, sparks fly, and partnerships are formed."

With their products in demand, DuPont and Honeywell are doing quite nicely on their own. And, understandably, they jealously guard their proprietary technologies and business strategies. But they don't compete only against each other – they compete against Teijin and Toyobo in Japan, manufacturers of Twaron and Zylon fibers, and Netherlands-based DSM, manufacturer of Dyneema fiber. Even the Chinese are entering the field, using their low costs and growing prowess in manufacturing processes to gain a toehold.

The competitive advantage of U.S. companies is productivity and innovation, in particular their ability to continually devise ways to add value in R&D, product development and manufacturing process. As demonstrated in industry after industry – computers in Silicon Valley, finance in Manhattan, film-making in Hollywood – innovation arises from the interchange of ideas from a wide variety of disciplines and perspectives. "That," says Winter, "is what we hope to recreate in Richmond."

The Greater Richmond Partnership started the process by publishing Richmond Catalyst two years ago with the goal of building a knowledge base of who the major players are in the region and what they're doing.

"We've learned a lot," Winter says. "We're more convinced than ever that our early instincts were right: Richmond has what it takes to be a world leader in high-performance materials. Now it's time to the next step. That's what the January meeting is all about. Let's get the conversation going."

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Read more articles about Richmond's advanced materials sector at
www.richmondcatalyst.com.

