

CARBON

FROM B1

Carbon fiber created in Parma

The complex was one of the major laboratories of Union Carbide's basic research program, modeled after the university-style corporate labs that became popular in the late 1940s and 50s, according to the American Chemical Society in its citation that named carbon fibers a National Chemical Landmark in 2003.

Roger Bacon had recently received his doctorate in physics when he joined the Parma staff in 1956.

"I got into carbon arc work, studying the melting of graphite under high temperature and pressures," Bacon told the society. "I took on the job of trying to determine the triple point of graphite. That's where the liquid, solid and gas are all in thermal equilibrium."

The equipment was akin to the early carbon arc streetlamps, only operating at much higher pressures, the society said. Small amounts of vaporized carbon would travel across the arc and then deposit as liquid. As Bacon decreased the pressure in the arc, he noticed the carbon would go straight from the vapor phase to the solid phase, forming a stalagmitelike deposit on the lower electrode.

"I would examine these deposits, and when I broke one open to look at the structure, I found all these whiskers," he said. "They were embedded like straws in brick. They were up to an inch long, and they had amazing properties. They were only a tenth of the diameter of a human hair, but you could bend them and kink them and they weren't brittle. They were long filaments of perfect graphite."

Bacon, who died in 2007, published a paper in the Journal of Applied Physics in 1960. But the fibers were still just a laboratory phenomenon, not a practical development, the society said. "I estimated the cost of what it took to make them, and it was \$10 million per pound," Bacon said.

Also, the first fibers, made by heating strands of rayon until they carbonized, produced fibers that had low strength and stiff-



COURTESY OF ROGER BACON

Physicist Roger Bacon, right, with lab technicians holding the first pound of continuously processed carbon fiber for the Air Force. Bacon discovered how to produce the stronger-than-steel product that launched a multibillion-dollar industry.

Suggestions

This story is part of a midsummer series about lesser-known inventions, ideas and innovations that originated in Northeast Ohio. If you have suggestions for future stories, please email your ideas to metrodesk@plaind.com.

ness because they were only 20 percent carbon.

Betsy Keck, spokeswoman for GrafTech, said the company could not provide someone to talk about carbon fibers. Information provided by the company stated that it began to commercialize carbon fiber cloth and felts for use in re-entry heat shields and rocket nozzle exit cones in the late 1950s. It began the first commercial production of processed carbon yarn, which led to the first development of

carbon fiber composites.

In the early 1960s, a process was developed in Japan using polyacrylonitrile as a raw material, according to companies that make carbon fiber. This produced a carbon fiber that contained about 55 percent carbon and had much better properties. About 90 percent of the carbon fibers produced are made from polyacrylonitrile.

Carbon fiber technology's future is in tiny carbon tubes called nanotubes, which many physicists are now studying.

These hollow tubes, some as small as 0.00004 inches (0.001 mm) in diameter, have unique mechanical and electrical properties that could lead to new ways to make high-strength fibers, submicroscopic test tubes or semiconductor materials for integrated circuits.

To reach this Plain Dealer reporter: kfarkas@plaind.com, 216-999-5079

KOMEN

FROM B1

650 walkers here raise nearly \$2M

"Komen has always had, and continues to have, a focus on low-income and uninsured women, and those are the ones who will be hurt."

Earlier this year, Komen received a flood of criticism for announcing it would pull funding from Planned Parenthood's breast cancer screening services. Komen officials said that an investigation launched by a Republican congressman questioning Planned Parenthood's use of federal money prevented Komen from continuing funding for the organization.

Three days later, amid public backlash, Komen reversed its decision. Abortions account for about 4 percent of Planned Parenthood's services, for which no federal money is used.

Seventy-five percent of net proceeds from the 3-Days go to fund national research and large public health outreach programs, Phillips said. The remaining 25 percent supports local community and affiliate programs.

Fundraising was down this year, too. Cleveland's 650 participants raised nearly \$2 million, which was \$500,000 less than last year.

"Our Komen 3-Day walkers are stronger than ever," said Phillips. But Komen is always "re-evaluating the entire 3-Day event" from everything from "marketing down to menu items."

Kathy Giller, 56, a homemaker from Akron, was the highest-grossing fundraiser at the Cleveland 3-Day for the fourth year in a row. Giller raised a little more than \$23,000.

"There is no magic behind my fundraising other than I'm very relentless," she said about financing her passion to find a cure.

Giller started walking in 2006, six months after her husband finished treatment for male breast cancer. Their first walk was in Boston, before a Cleveland event existed, and this weekend marked their 14th time participating in the 3-Day.

At the closing ceremony on Sunday, hundreds of participants raised a shoe as a tribute to those affected by breast cancer. Giller was there with her team, "Breast Man Walking," named in honor of her husband, a survivor.

"We met people walking from every part of the country and hearing everybody's stories you get a tremendous sense of hope," said Giller. "Together, we'll get there."

HIGHER EDUCATION

Department of Education has new financial aid website

The U.S. Department of Education has unveiled a new streamlined website to make it easier for students and families to navigate the financial aid process and decide how to pay for college.

StudentAid.gov allows users to find federal student aid information, apply for federal aid and repay student loans. The site is designed to be fully accessible on tablets and smartphones.

In addition, the department has revamped its Federal Student Aid social media sites, including Facebook, YouTube and Twitter, to provide more options for students to learn about student aid.

Also included on StudentAid.gov is the Student Loan Debt Collection Assistant, an interactive tool designed to help borrowers who have fallen behind on their federal or private student loan payments.

The tool was developed in partnership with the Consumer Financial Protection Bureau and is also available through the bureau's site. It can help borrowers access alternative payment plans and shows repayment options for borrowers in default on their federal student loans.

Chancellor University under scrutiny: Chancellor University, a for-profit institution that succeeded Myers University, is again in danger of losing its accreditation.

The Higher Learning Commission of the North Central Association, the regional accrediting agency, issued a show-cause order on June 28, requiring Chancellor to submit a report by Sept. 4 showing that it has addressed concerns raised by the commission regarding financial self-sufficiency, enrollment, strategic planning and student retention so that it can maintain its accreditation.

If Chancellor does not submit the report or if it cannot show that it has adequately addressed the commission's concerns and meets the required criteria, the commission said it will withdraw the university's accreditation.

Students cannot receive federal financial aid if a university is not accredited.

President Robert Daugherty said Friday that the university would prevail, as it did when it overcame issues cited by the commission when the panel also issued a show-cause order in February 2010. The university re-



KAREN FARKAS

sponded and the order was lifted in February 2011, but Chancellor was required to submit quarterly

reports. Following those reports and a visit in February, the commission issued its new order.

Chancellor, which moved from Cleveland to Seven Hills in November 2011, expects to enroll about 500 students this fall, Daugherty said. About 80 percent take courses online.

Chancellor was one of 30 institutions examined in a report on for-profit higher education issued by the U.S. Senate July 30. That report said many for-profit institutions have low retention rates and students leave without a degree, but owing thousands in loans.

Compared to other colleges offering the same degree, a bachelor of science in business administration with a concentration of accounting costs \$47,000 at Chancellor compared to \$38,844 at Ohio State University, the report said.

The report said 87.4 percent of Chancellor's revenue in 2010 was from federal financial aid programs. It said Chancellor allocated 20 percent of its expenditures, or \$20 million, to marketing and recruiting in 2009. That year its expenses exceeded its revenue by \$6.9 million.

Unlike the other institutions, Chancellor failed to provide information to allow the Senate Health, Education, Labor and Pensions Committee to accurately analyze the number of students who withdrew, the report said.

Twinsburg student wins scholarship: Madison Chicks, who will be a senior at Twinsburg High School, won a renewable scholarship to Notre Dame College at the annual Catholic Diocese of Cleveland festival on Sunday.

Her name was drawn from about 400 entries. She told officials at the South Euclid college that she plans to enroll in 2013. She will receive a \$10,000 scholarship each year as long as she maintains academic standing.

To reach this Plain Dealer reporter: kfarkas@plaind.com, 216-999-5079

**THE PLAIN DEALER
ELECTRONIC EDITION
NOW AVAILABLE for the
iPad®**
As low as 4¢ per day when
added to your print subscription!

Access online from home, office or while you are traveling.

Available by 4am – news, sports, and entertainment.

See every page exactly as you would in our printed edition.



Subscribe at www.plaindealer.com/ipd-subscribe
or CALL TODAY 1-888-559-7555

Lost & Found

Lost and Found Rewards

LOST Dog
Jackson Missouri St.
Lorain July 27. All
black, grey muzzle.
Answers to Skippy.
Very friendly.
(440)567-1869

Small Ads. Big Response.
Read Classifieds
Everyday.

To place a listing,
call 216-999-5555

THE PLAIN DEALER
POWERING CLEVELAND.COM

Advance Your Career
Make your job search simple with
The Power of Two:
The Plain Dealer and cleveland.com/jobs.

URSULINE COLLEGE ACCELERATED PROGRAM (UCAP)



"UCAP inspired me to reach for higher goals and believe in my full potential."

Darlene Majc, PHR
Human Resources Generalist,
Int'l. Operations, Cleveland Clinic
Business Management Graduate

Now is your time —
complete your degree!

UCAP INFORMATION SESSION

Wednesday, August 8 6:00 – 7:30 PM, Pilla Student Learning Center

UCAP enables busy adults to complete a bachelor's degree or certificate quickly and conveniently. RSVP or contact us for a personal appointment.

Ursuline



ursuline.edu/ucap
440 684 6130

KASICH

FROM B1

Kasich to speak at GOP convention

"And under a Romney administration, I believe on Day One we begin to make progress to turn things around in the Ohio economy and the national economy. So to the extent that I will be given an opportunity to talk, that's what I'm going to be talking about."

But nothing scheduled so far?
"No."

Past notable convention speakers have included Barack Obama, then a candidate for U.S. Senate, in 2004, at the Democratic National Convention, and Ronald Reagan, then a former California governor, at the 1976 Republican National Convention.

For every future president, of course, dozens of other speakers have appeared at conventions — and gone back to their home states to stay. But a convention spot at least signals to home-state voters that the national party considers Kasich worthy of a national audience.

In a statement released by the Republican National Convention, Kasich said: "This election comes down to one thing — jobs. In Ohio, we know what that means. It means we need a leader who believes in American innovation, American ingenuity and the can-do American spirit that embodies our country. That leader is Mitt Romney, and I am honored to be a part of officially nominating him at the Republican National Convention in Tampa."

To reach this Plain Dealer reporter: skoff@plaind.com, 202-567-2600