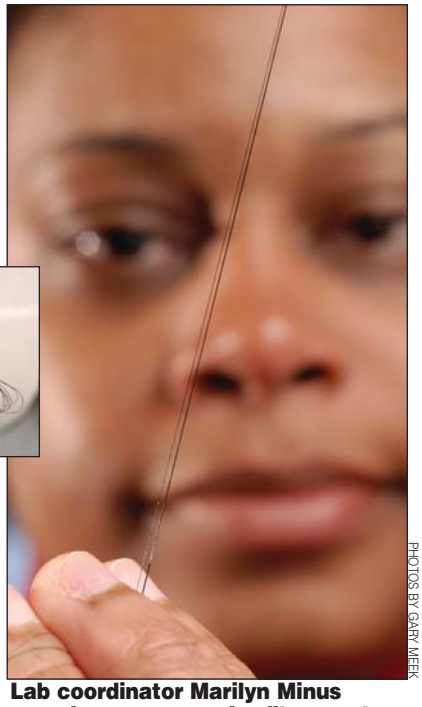
A New Class of Fibers

Strong and versatile carbon nanotubes are finding new applications in improving conventional polymer-based fibers and films. For example, composite fibers made from single-walled carbon nanotubes (SWNTs) and polyacrylonitrile – a carbon fiber precursor – are stronger, stiffer and shrink less than standard fibers.

Nanotube-reinforced composites could ultimately provide the foundation for a new class of strong and lightweight fibers with properties such as electrical and thermal conductivity unavailable in current textile fibers.



PHOTOS BY GARY MEEK

Lab coordinator Marilyn Minus examines a composite fiber made of single-walled carbon nanotubes and polyacrylonitrile – a carbon fiber precursor. The composite fibers (inset) are stronger, stiffer and shrink less than standard fibers.

Researchers from Georgia Tech, Rice University, Carbon Nanotechnologies Inc. and the U.S. Air Force have been developing new processes for incorporating nanotubes into fibers and films. The results of their work were presented at the 227th national meeting of the American Chemical Society in March 2004.

"We are going to have dramatic developments in the textile materials field over the next 10 or 20 years because of nanotechnology, specifically carbon nanotubes," predicts Satish Kumar, a professor in Georgia Tech's School of Polymer, Textile and Fiber Engineering. "Using carbon nanotubes, we could make textile fibers that would have thermal and electrical conductivity, but with the touch and feel of a typical textile. You could have a shirt in which the electrically-conducting fibers allow cell phone functionality to be built in without using metallic wires or optical fibers."

Recently, Kumar's research team and Richard Smalley, a Rice University professor and Nobel Prize winner, developed a technique for producing composite fibers containing varying percentages of carbon nanotubes. This addition can double the fibers' stiffness, reduce shrinkage by 50 percent, raise the temperature at which the material softens by 40 degrees Celsius and improve solvent resistance. Kumar believes these properties will make the composite fibers valuable to the aerospace industry, where the improved strength could reduce the amount of fiber needed for composite structures, cutting weight.

Enzyme Inhibitor for Adult T-Cell Leukemia

Researchers are analyzing several compounds that may inhibit the enzyme that is essential for the reproduction of the Human T-cell Leukemia Virus Type 1 (HTLV-I), which has infected 15 to 20 million people worldwide. The virus causes the fatal adult T-cell leukemia in up to 10 percent of those infected.

Little is known about the HTLV-I enzyme, or protease, that cuts long strings of amino acids to form functional proteins that make a mature HTLV-I virus — a distant cousin of the HIV virus that causes AIDS. Researchers at Georgia Tech presented their findings about HTLV-I inhibitors at the 227th national meeting of the American Chemical Society in April 2004.

"There are currently no good ways to treat HTLV-I and prevent the spread of the virus," says Suzanne B. Shuker, an assistant professor of chemistry and biochemistry at Georgia Tech. "Therapies that inhibit the life cycle of the virus have potential as treatments for HTLV-I infection. The protease from HTLV-I is therefore an attractive target for inhibitor design."

As they test possible inhibitor compounds, Shuker and her students are also working to understand more about the enzyme's activity and structure to help in the development effort. A Georgia Tech and Centers for Disease Control and Prevention (CDC) seed grant is funding the current work.

Research team member Bryan Herger, a fourth-year Ph.D. student in Shuker's lab, studies how the protease functions and how it identifies the amino acids it's supposed to cut. This information helps fourth-year Ph.D. student Kelly Dennison and other team members find compounds that mimic the HTLV-I protease's process of cutting amino acids. The six compounds they are investigating now contain statine, 4-amino-3-hydroxy-5-phenylpentanoic acid or hydroxyethylamine. Researchers believe these compounds are potent protease inhibitors.

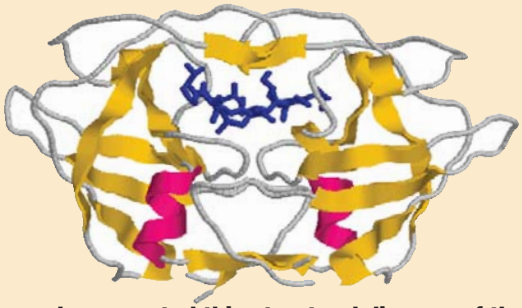


IMAGE COURTESY OF SUZANNE SHUKER

Researchers created this structural diagram of the HTLV-I protease.

Wavelet Bootstrapping

For certain classes of data that may be very expensive or difficult to obtain, a new statistical technique may provide useful information from a single data run by allowing meaningful re-sampling.

The technique, known as "wavelet bootstrapping" or "wavestrapping," has applications in the geophysical sciences, bioinformatics, medical imaging, nanotechnology and other areas. It also can be useful for rapidly obtaining information from small data sets in such applications as medical diagnostics.

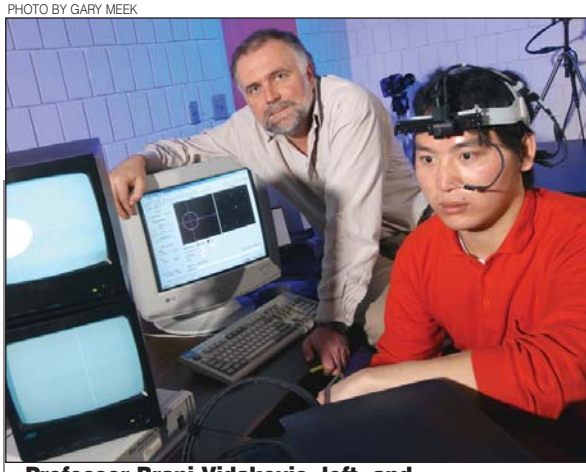
Wavelets are mathematical functions that have become increasingly important to researchers because of their ability to analyze data sets that are difficult to understand using traditional techniques such as Fast Fourier Transform. For instance, signals within noisy data recorded in the time domain can become more meaningful when analyzed in the wavelet domain.

Wavestrapping was pioneered by University of Washington researchers, who applied wavelet transforms to an established statistical re-sampling technique known as bootstrapping, which is used to extract additional information from single data runs. The marriage of bootstrapping and wavelets offers a new tool for the analysis of data sets that would otherwise be difficult to study because of correlation and time-dependency issues.

"The new thing here is re-sampling, but not in the time domain, which would be nearly impossible because of the strong dependence of data or correlation of data," says Brani Vidakovic, a professor in Georgia Tech's School of Industrial and Systems Engineering. "By transferring the data to the wavelet domain, applying re-sampling methods and then returning the re-sampled data as variants in the time domain, you can then proceed as if you had a data ensemble rather than a single run."

Vidakovic discussed his research on validating wavelet bootstrapping strategies and assessing their variability bounds at the annual meeting of the American Association for the Advancement of Science in Seattle in February 2004.

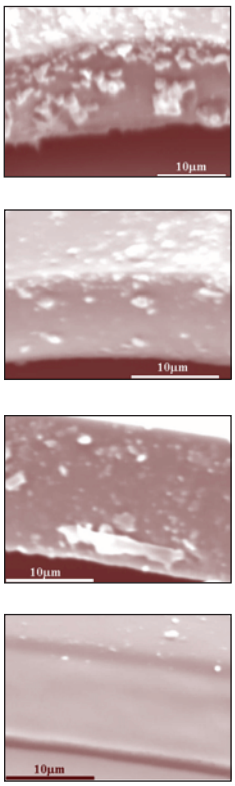
PHOTO BY GARY MEEK



Professor Brani Vidakovic, left, and graduate student Bin Shi demonstrate a pupil diameter measurement system being used in the Laboratory for Human-Computer Interaction and Health Care Informatics at Georgia Tech. Data analysis is being done using wavelet bootstrapping.

Polymer Libraries

IMAGES COURTESY OF CARSON MEREDITH



Today's advanced materials have become extremely complex in chemistry, structure and function, which means scientists need faster, more efficient ways to model and test new designs.

J. Carson Meredith, an assistant professor of chemical and biomolecular engineering at Georgia Tech, has pioneered combinatorial synthesis and high-throughput screening in polymer science – techniques that allow researchers to create and evaluate thousands of polymeric materials in a single experiment. Meredith presented recent advances in biomedical and electronic polymers at the American Chemical Society's 227th national meeting in April 2004.

In the late 1990s, Meredith developed a technology for depositing large collections of polymers on a single microscope slide, using property gradients to create thousands of variations in composition, temperature and thickness. These polymer libraries dramatically reduce the time and effort required to develop new materials, he notes. What's more, statistical reliability is increased when taking measurements under the same environment.

Since 2000, Meredith has been applying his technologies to develop new materials in the biomedical and electronic arenas.

"Biomedical materials are especially challenging to design because they must be compatible with the human body," Meredith explains. "Yet the physical surface of polymers can affect the attachment and function of biological cells."

Achieving control over cellular interaction with synthetic surfaces will open new doors in biomaterials, such as engineering artificial tissues that are alternatives to organ transplants or deliver drugs only to diseased cells.

Collaborating with Andrés García in the Georgia Tech School of Mechanical Engineering, Meredith has already developed a technique for growing bone cells on polymer libraries and discovered a unique polymer formulation that causes optimal function.

These SEM micrographs represent fracture surfaces at various impact sites from high-throughput mechanical screening on a composition-gradient library of polyurethane urea.

3-D Chemistry

A three-dimensional microfabrication technique that uses a unique class of light-activated molecules to selectively initiate chemical reactions within polymers and other materials could provide an efficient way to produce complex structures with sub-micron features.

Known as "two-photon 3-D lithography," the technique could compete with existing processes for fabricating microfluidic devices, photonic bandgap structures, optical storage devices, photonic switches and couplers, sensors, actuators, micromachines – and even scaffolds for growing living tissue.

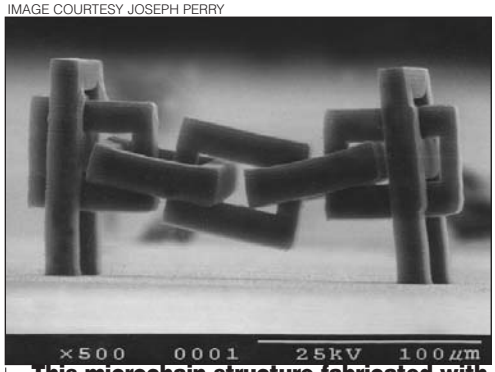
Georgia Tech researcher Seth Marder described the technique at the annual meeting of the American Association for the Advancement of Science in February 2004.

"We have developed a disruptive platform technology that we believe will provide broad new capabilities," says Marder, a professor in the School of Chemistry and Biochemistry. "We believe this technique provides a real competitive advantage for making complicated three-dimensional microstructures."

The technique uses a family of organic dye molecules known as Bis-donor phenylene vinylenes that have a special ability to absorb two photons of light simultaneously. Once excited, the molecules transfer an electron to form a simple acid or a radical group that can initiate a chemical reaction – such as polymer cross-linking or ion reduction.

By adding small concentrations of the molecules to a resin slab containing cross-linkable acrylate monomer, for example, researchers can use a focused near-infrared laser beam to draw patterns and initiate cross-linking reactions only in material exposed to the light. The reactions can make that portion of the slab insoluble, allowing the remainder to be washed away to leave a complex 3-D structure.

IMAGE COURTESY JOSEPH PERRY



This microchain structure fabricated with the "two-photon 3-D lithography" process is an example of a structure that would be difficult to produce layer-by-layer with 2-D lithographic processes. The links are topologically connected, but not directly anchored to the surface.

The researchers have demonstrated the ability to create both positive and negative resists using two-photon activated reactions to alternatively create soluble or insoluble 3-D patterns. Beyond polymers, Marder and collaborator Joseph Perry have demonstrated the fabrication of tiny silver wires from patterns written in materials containing silver nanoparticles and ions.

PHOTO BY NICOLE CAPPELLO

Associate Professor of Chemistry and Biochemistry Nick Hud uses a pipette to sample RNA. He is working to uncover how molecules similar to RNA and DNA first appeared on Earth around 4 billion years ago.

Molecular Midwives

By adding a small molecule, dubbed a "molecular midwife," researchers increased the rate of DNA formation in a chemical reaction 1,000 fold over a similar reaction lacking a midwife.

The discovery is an important step in the effort to trace the evolution of life to the earliest self replicating molecules.

The results of the Georgia Tech study were reported in the April 2, 2004 edition of the German chemistry journal *Angewandte Chemie*.

"We are working to uncover how molecules similar to RNA and DNA first appeared on Earth around 4 billion years ago," says Nicholas Hud, an associate professor of chemistry and biochemistry at Georgia Tech. "Our theory is that small, simple molecules acted as templates for the production of the first RNA-like molecules. Many of these small molecules, or molecular midwives, would have worked together to produce RNA by spontaneously mixing and assembling with the chemical building blocks of RNA."

Today, RNA is present in all cells and is responsible for transmitting genetic information from DNA to proteins. Many scientists believe that RNA, or something similar, was the first molecule on Earth to self-replicate and begin the process of evolution that led to more advanced forms of life.

Hud first proposed the idea of a molecular midwife in a paper published in the *Journal of Theoretical Biology* in 2000, along with co-author Frank Anet, a professor emeritus at the University of California at Los Angeles. The problem, they explain, was this: When you throw all the components needed to make RNA into a soup, the ingredients do not spontaneously form RNA. But there may have been other molecules present at the dawn of life that would have increased the chances RNA would form. If this were true, then it would provide a missing link in the evolution of life's earliest molecules, they add.

For more information on these news items, see gtresearchnews.gatech.edu/links

Accessibility in Design

Researchers have developed a method for determining the accessibility of office machines and other electronic and information technologies.

The procedure, developed by engineers at the Georgia Tech Research Institute, helps identify design changes that would make these devices easier to use by people with physical or cognitive disabilities. In addition, meeting federal accessibility standards is a prerequisite for companies seeking government business.

The first performance-based evaluations were conducted for Ricoh on the company's copier-based multi-function digital imaging systems. Each evaluation examined accessibility for seven disabilities: blindness; low vision; limited upper mobility; limited lower mobility; and impairments in hearing, speech, and cognitive ability.

The process included a checklist of the accessibility of features, such as control and maintenance panels, paper tray, document feeder and documentation. The machines were also operated in a controlled setting by individuals with disabilities, and their experiences were recorded.

The resulting analysis pointed not only to areas for improvement, but outlined approaches for achieving accessibility. Ricoh expects to incorporate the suggestions into the initial design stage of its next generation of products, researchers said. Consideration of accessibility issues early in the process will lead to products that are easier for everyone to operate.

PHOTO BY NICOLE CAPPELLO

The Georgia Tech Research Institute has developed a method for determining the accessibility of office machines and other electronic and information technologies.

To Be or Not To Be Vaccinated

A physician's assistant is administering the second part of a Hepatitis B vaccination to a 9-month-old infant as his mother comforts him.

PHOTO BY JIM GATHANY, COURTESY OF CDC

In general, people in the United States view vaccines as safe. But that perception may change when questions are raised about what public health officials don't know about vaccines, research suggests.

That is a phenomenon noted in general risk acceptability studies and readily applies to vaccination, says Ann Bostrom, a Georgia Tech associate professor of public policy. She presented research on vaccine risk acceptability at the American Association for the Advancement of Science (AAAS) annual meeting in February 2004.

"People avoid ambiguity," Bostrom says. "They perceive risks that are unfamiliar as less acceptable than risks that are familiar, in general."

Risk perception and acceptability are also dependent on context – both personal and societal, she notes. First-hand experience with adverse reactions to vaccines, for example, affects a person's risk acceptance. Bostrom cited evidence from collaborative research she and her colleagues will soon publish.

Bostrom also discussed the sometimes-controversial public decision-making process on vaccination policy.

"Controversy isn't always a bad thing," she explains. "Conflicts of interest can be real, and both scientific and policy processes should be scrutinized. Science, and in particular the science that has enabled vaccine development, has given us much longer, healthier lives. But engineering our immune systems is no mean task, and thinking broadly about that bigger picture is important."

Individual and public decision-making processes about vaccines are sometimes at odds, Bostrom notes. For example, a hypothetical vaccination policy might be chosen to minimize disease risk to the public as a whole, while increasing the risk to some small subpopulation that is susceptible to a vaccine risk.

"The ideal of using both analytic and deliberative processes to reach agreement (not necessarily consensus) on what society should do is one many hold high," Bostrom says. "The aim is to find ways of improving both individual and collective welfare."

Taking the Heat

Maintaining large rotating equipment isn't easy or cheap. Take gas turbines used in power plants: Inspecting one of these behemoths for possible wear and tear costs about $500,000 in parts and labor. If companies skip on periodic checkups, they risk breakdowns averaging $4 million per incident.

Yet Atlanta-based Radatec Inc., founded in 2001, is about to transform condition monitoring with a new breed of non-contact displacement sensor developed at Georgia Tech's Manufacturing Research Center and the Georgia Tech Research Institute.

Scheduled for commercial release in summer 2004, Radatec's sensors provide real-time information about critical mechanical components in areas that were previously off limits.

PHOTO BY GARY MEEK

Scheduled for commercial release in summer 2004, Radatec's sensors provide real-time information about critical mechanical components in areas that were previously off limits. Shown here is Dave Burgess, the company's business development manager.

"We take the guesswork out of maintenance," says Scott Billington, Radatec's president and co-founder. "Instead of having to shut down heavy equipment, Radatec's sensors allow operators to virtually see inside complex machinery and predict when repairs are needed."

Based on microwave technology, Radatec's innovative sensors measure motion by sending a continuous microwave signal toward a vibrating or rotating object. This signal is reflected back to a radio receiver in the sensor. A patented algorithm then compares the transmitted signal with the received one, calculating a measure of displacement.

In contrast to existing sensors that use capacitive, eddy current or laser technologies, Radatec's sensors:

- Operate at extremely high temperatures – up to 2,500 degrees Fahrenheit.
- Remain unaffected by contaminants such as oil, dust and carbon deposits.
- Are immune to electromagnetic interference.

These unique characteristics allow Radatec's sensors to operate in harsh environments. "Existing sensors work well in certain applications, but can't be used in areas where it's very hot, dirty or contaminated," says Jonathan Geisheimer, Radatec's co-founder and vice president. "And because these regions are often the most stressed areas of machinery, it's where major problems develop first."

Analyze That

A technology-transfer success story, VantagePoint is generating its first royalties to Georgia Tech. Although initially modest — less than $10,000 in 2003 — royalties are expected to increase significantly with a new version of the company's text-mining software.

Developed through a strategic alliance between Georgia Tech and Atlanta-based Search Technology Inc., VantagePoint allows technical-intelligence managers to quickly analyze search results from bibliographic databases and R&D literature. The text-mining tool produces summaries, charts and graphs that help people spot patterns and relationships in massive amounts of data, enabling them to extract relevant information and make better decisions.

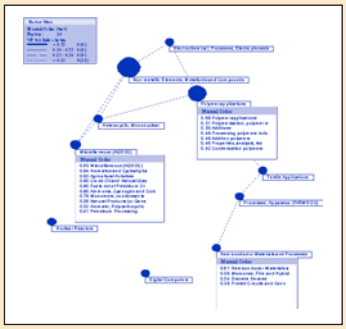
Competitive technical intelligence is the name of the game, says Alan Porter, a Georgia Tech professor of industrial and systems engineering and public policy. He developed the technology that resulted in VantagePoint.

"Today it's critical to have the right technology at the right time," Porter explains. "Companies want to keep an eye on competitors so they don't drop the ball by introducing a new product or technology too late. For example, Ford looks to see what is published by and about Toyota – and more important, what it's patenting, because that shows what Toyota is really interested in."

In addition to staying a step ahead of rivals, VantagePoint also assists with technology management and R&D efforts by helping:

- Identify what inventors are up to, along with the organizations sponsoring their research — information that can lead to potential mergers or acquisitions.
- Uncover licensing opportunities.
- Pinpoint patent infringements.
- Track and forecast trends in specific technology areas.
- Identify new technologies or new venues to apply existing technologies.

IMAGE COURTESY OF ALAN PORTER



VantagePoint software allows technical-intelligence managers to quickly analyze search results from bibliographic databases and R&D literature. The text-mining tool produces summaries, charts and graphs, such as this one, to help people spot patterns and relationships in massive amounts of data.

PHOTO BY NICOLE CAPPELLO

George Riley, right, a professor of electrical and computer engineering and adjunct professor in the College of Computing, and graduate student Robby Simpson lead the NETI@home project.

Internet Performance

Millions of Internet users bemoan sluggish downloads and slow e-mail, but rarely know the cause of the delays. So, researchers at Georgia Tech have developed a technology to determine how the Internet is performing from the end-users' perspectives. With this information, they can design and develop network solutions to relieve these bottlenecks. But first, they need volunteers for the NETI@home project, which stands for "Network Intelligence at Home."

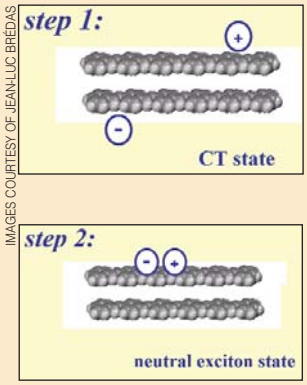
Historically, industry and academia have used data on the Internet's performance measured at various router points in the interior of the Internet — before it reaches the individual user.

"We think a better solution is to measure performance at the individual-user's vantage point to determine how the Internet is actually performing, but currently this data doesn't exist. That's where NETI@home comes in," says George Riley, an assistant professor in the School of Electrical and Computer Engineering and adjunct professor in the College of Computing. "We need thousands of computer users to use our free NETI@home software to help us gather this data."

To do this, Riley and graduate student Robby Simpson developed an open source software application that collects network performance statistics such as average response time, average round trip time, connection times, download times, and number of packets and bytes sent and received. The application then regularly reports these statistics to the NETI@home server at Georgia Tech. Designed to be unobtrusive, the software runs quietly in the background with little or no intervention by the user. The reports sent to Georgia Tech are also stored on the user's computer, so the user can see what statistics are gathered.

Computer users can download the NETI@home application at **www.neti.gatech.edu**. Users also may download an optional NETI mapping application, which displays a geographical map of where their computer is connected on the Internet.

IMAGES COURTESY OF JEAN-LUC BRÉDAS



A two-step charge recombination process begins when two initially separated charges combine to form a loosely bound, charge-transfer (CT) state. That then decays down to a lower singlet or triplet neutral exciton state.

Boosting the Efficiency of OLEDs

Organic light-emitting diodes (OLEDs) based on pi-conjugated polymers offer significant advantages over other display materials. They are lightweight, flexible, easily tailored, operate on low voltages and can be deposited on large areas using simple techniques such as ink-jet printing or spin-coating.

By combining the electrical properties of metals and semiconductors with the mechanical properties of plastics, these materials are poised to provide a foundation for new generations of flexible displays for computers and other devices. Until recently, however, many researchers believed these light-emitting polymers were limited in their efficiency, able to convert no more than 25 percent of their energy into light.

But in a presentation made at the 227th national meeting of the American Chemical Society in March 2004, researchers made the theoretical case that efficiency of the materials can be much higher. Based on theoretical calculations done by scientists at universities on three continents, the study should encourage researchers to pursue techniques that could improve efficiency of the polymer devices, says Jean-Luc Brédas, a professor in the School of Chemistry and Biochemistry at Georgia Tech.

"These results are important in the sense that they lead to an understanding of why polymer LEDs can have an efficiency that goes beyond the 25 percent limit predicted on the basis of simple spin statistics," says Brédas, who also is part of a research team at the University of Mons-Hainaut in Belgium. "It's important to show that there are ways past this theoretical limit."

Aging in Place

Younger adults might cringe at the thought of being monitored in their homes by technology. Yet a new Georgia Tech study indicates that older adults are willing to give up some privacy — if it enables them to remain independent longer.

PHOTO BY GARY MEEK

A Georgia Tech study surveyed older adults on their opinions about technologies, such as "Cook's Collage," to help them live independently longer. Cook's Collage photographs people during meal preparation and displays the cook's six most recent actions on a flat-panel display mounted over the countertop.

"That illustrates how important it is to older adults to stay in their homes rather than move into some type of assisted-living housing," says Wendy Rogers, a professor of psychology at Georgia Tech. Rogers presented preliminary findings of the study at CHI2004, an international conference on computer-human interaction held in April.

The study, which examined older adults' perception of a technology-rich home environment, was part of the multidisciplinary Aware Home project conducted at Georgia Tech's Broadband Institute Residential Laboratory. The laboratory, funded in part by the Georgia Research Alliance, is a unique three-story house where researchers focus on domestic technologies for the future. The study Rogers presented was funded by the National Science Foundation and the National Institutes of Health.

For this study, researchers invited 44 adults ages 65 to 75 to tour the residential laboratory and view new technologies designed by Georgia Tech College of Computing researchers specifically to help people age in place. These technologies ranged from low to high levels of intrusiveness. Researchers asked participants what they specifically liked and disliked about the technologies.

"Understanding how older adults evaluate technology provides insights into their judgments and decision-making processes, which will help us design tools they will actually use," Rogers says. "Technology in the home is useless if people don't want it."

Unlike younger adults, older people don't care if a technology is the latest thing or a status symbol. Instead, what sparked interest among study participants was the degree to which a particular technology could benefit them.

Another key factor was whether they viewed the technology as a luxury or necessity. "They were more willing to embrace a technology if they perceived a need and if they had some degree of control," Rogers says.

Phytoplankton & Climate Change

New research shows that what was once considered a universal constant in oceanography could actually vary in the future – depending on the ecological scenarios that affect competition for resources among microscopic marine plants, which play a role in global climate.

The future of these plants, called phytoplankton, is important because they exist at the base of the marine food web and represent a large source of food for fish. Also, they affect global climate by using atmospheric carbon dioxide, a greenhouse gas.

Phytoplankton depend upon nitrogen and phosphorus to grow and, ultimately, replenish the supply of these nutrients in the ocean. Since the 1930s, scientists have known that the average nitrogen-to-phosphorus (N:P) nutrient ratio of phytoplankton closely mirrors the N:P ratio in the ocean – 15:1 for the plants and 16:1 for the water. Scientists accepted this as a constant called the Redfield ratio, named after the late Harvard University scientist Alfred Redfield.

But researchers at Georgia Tech and Princeton University designed a mathematical model based on phytoplankton physiology. It shows a broad range of N:P ratios are possible depending on the conditions under which species grow and compete. This research – part of a larger biocomplexity research project led by Professor Simon A. Levin at Princeton — was published in the May 13, 2004 edition of the journal *Nature*.

"The take-home message is that this finding reinforces what some researchers have been saying lately – that N:P is not so fixed," says lead author Christopher Klausmeier, a Georgia Tech assistant professor of biology and former postdoctoral fellow at Princeton. Other authors are Elena Litchman, also of Georgia Tech, and Tanguy Daufresne and Levin of Princeton.

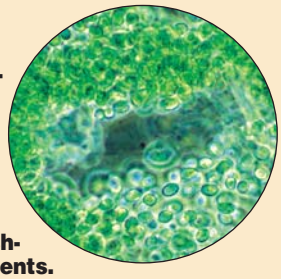


PHOTO BY HANS PAERL, COURTESY UNIVERSITY OF NORTH CAROLINA'S *ENDEAVORS* MAGAZINE

This microscopic image shows clumped cells of blue-green algae, a type of phytoplankton that lives in marine and freshwater environments.

"This shows the range of ratios within which we could expect the ocean to change in the future," Klausmeier says. "Right now we have 16:1, but 500 years from now, if we have a different mix of growth conditions, then it might change the overall N:P needs of the phytoplankton community and the ocean."

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Spinal Disc Repair

PHOTO BY GARY MEEK

Professor Barbara Boyan, right, and her colleagues developed the spinal disc repair technology that is the basis for the start-up company Orthonics. Here, she works with researchers Zvi Schwartz, center, and Jonathan Turner.

Orthonics, Inc., an Atlanta start-up company developing new biomaterials for spinal disc repair and regeneration, recently received initial funding from Viscogliosi Brothers LLC – a New York-based, closely held venture capital/private equity and merchant banking firm focused on the musculoskeletal/orthopedics industry. Terms of the funding were not disclosed.

The funding provides the private-sector match for the company's Phase II grant from VentureLab, a Georgia Research Alliance program that encourages commercialization of technologies developed in Georgia's research universities. The funding will allow Orthonics to continue development of its spinal disc repair and regeneration technologies, which are based on research at Georgia Tech.

Spinal discs are tough, rubbery materials that separate vertebrae in the spinal column. When damaged, they can press on nerves and cause pain. Surgeons can remove the damaged disc and fuse the spinal vertebrae, but that procedure greatly limits motion in the back. Orthonics' novel biomaterials could provide a non-fusion alternative in the more than one million spinal surgical procedures that take place each year – an estimated $3 billion market.

"We're extremely pleased with this investment. The Viscogliosi Brothers have an outstanding track record in orthopedics and their investment in Orthonics is a great endorsement of our business plan and technology," says Orthonics CEO Steve Kennedy. Both parties expect that Viscogliosi Brothers will be the lead investor in a round of seed financing to take place in 2004.

Orthonics' technology is based on research from the laboratory of Barbara Boyan, the Price Gilbert, Jr. Chair in Tissue Engineering and deputy director of research for the Georgia Tech/Emory Center for the Engineering of Living Tissues. Boyan is also the Georgia Research Alliance Eminent Scholar in Tissue Engineering.

The company's technology includes an improved hydrogel biomaterial and a novel surface patterning technique used to create a more natural attachment between the artificial material and bone or cartilage tissues.

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