Views You Can Use

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Today's advanced technologies are spawning new fields and career options like never before. Consider the emerging discipline of "biomimetics" in which researchers are mimicking nature on a whole new level to create new materials and devices. You will hear much more about this critical topic and what it means for education in my keynote at the Model Schools Conference on June 30-July 3 in Washington, D.C. I hope to see you there.

Sincerely,

Bill Daggett

Biotechnology Trends

Biomimetics: Probing Nature in a New Age

The concept of taking ideas from nature and implementing them in applications and machines is nothing new. The wings of birds remain the inspiration for building better aircraft, for example. What is new are the ever-advancing technologies that allow us to probe further into Mother Nature's secrets. The result is the emerging field of "biomimetics." Some of the latest developments in biomimetics are "gecko tape" and wall-climbing robots based on the 2002 discovery of how gecko feet can cling to just about anything. Geckos' toes are covered with densely packed hair-like structures called setae, which are so thin that they can feel a weak electrical attraction among atoms.

Sources: http://en.wikipedia.org/wiki/Biomimetic
www.pbs.org/kcet/wiredscience/geekbeat.html

Researchers Gel with Sea Urchins and Venus Flytraps

Inspired by the mechanisms of sea urchins and Venus flytraps, researchers at Alcatel-Lucent's Bell Laboratories have developed a new gel that could be used to make microscopic drug-releasing devices and water-repellant clothes. The gel straightens silicon fibers at the touch of moisture and leaves them limp as it dries. The researchers poured a film of gel onto a pincushion-like array of silicon fibers, each about as tall as a human hair is wide (100 nanometers). When the hydrogel is dry, it clings to the silicon wafer, letting the prongs sag. When moisture expands the gel, the gel fills up the spaces between silicon columns and forces them to stand upright. Such a property might help create more water-repellant materials because excess water would bead on top of the expanded surface and roll off. Researchers say more complex shapes might lead to small pockets capable of opening and closing to release drug-coated beads or chemicals.

Source: www.sciam.com/article.cfm?chanID=sa001&articleID=5B4CAE05-E7F2-99DF-3EBF12525DD80E14

Brighter than Ever

Researchers have discovered the source of the blinding whiteness of a beetle called *Cyphochilus*. The discovery could help make everything from paints to T-shirts much brighter. The beetle scales contain a porous network of random protein fibers, each about 250 nanometers wide, that scatter all wavelengths of light strongly, the prerequisite for an intense white color, says Pete Vukusic of Exeter University in England whose work was reported in the January 2007 issue of *Science*. The more layers a material has, the stronger it can scatter light and the brighter its color. The brightness of the color results from gaps of air between the filaments. Light scatters every time it passes between two materials that differ greatly in the speed of light through them, also called their refractive index. Like facets in a diamond, the more places light can scatter, the brighter the ultimate color.
www.sciam.com/article.cfm?articleID=36515D92-E7F2-99DF-395FEA10BEBBB2FA

Nanotechnology Trends

Targeting Cancer

Novel nanoparticles that Researchers at Massachusetts Institute of Technology have developed could help identify tumors via cancer imaging and deliver chemotherapy locally. A key feature of these nanoparticles is that they mimic blood platelets. Platelets flow freely in the blood and act only when needed by zoning in on injured blood vessels and accumulating there to form clots. Similarly, these new nanoparticles could key in on particular features of tumor blood vessels to deliver treatment or choke off the blood supply to the tumor. In addition, by slipping through tiny gaps in fast-growing tumor blood vessels and then sticking together, the particles could create masses with enough of a magnetic signal to be detectable by a magnetic resonance imaging (MRI) machine.

Source: http://web.mit.edu/newsoffice/2007/bhatia.html

The Right Interconnection

Researchers at Rensselaer Polytechnic Institute have created hybrid structures that combine the best properties of carbon nanotubes and metal nanowires. The new structures, which are described in a recent issue of *Applied Physics Letters*, could help overcome some of the key hurdles to using carbon nanotubes in computer chips, displays, sensors, and many other electronic devices. The impressive conductivity of carbon nanotubes makes them promising materials for a wide variety of electronic applications, but techniques to attach individual nanotubes to metal contacts have proved challenging. The new approach allows the precise attachment of carbon nanotubes to individual metal pins, offering a practical solution to the problem of using carbon nanotubes as interconnects and devices in computer chips.

Source: http://news.rpi.edu/update.do

Economic Trends

Virtual Assistants

When entrepreneurs first start out on a business venture, they typically are inundated with mounds of paperwork and all the other essentials it takes to sustain a new business. Now the virtual assistant (VA) is here to help. Taking advantage of the Internet and the global trend of outsourcing administrative and technical work, VAs have developed their own business ventures as independent entrepreneurs who provide administrative, creative, and/or technical services. A VA can help a company meet seasonal demands, provide writing and marketing skills for a special project, and help meet the demands of business growth domestically or globally. VAs often enter into business relationships on a continuing contractual basis, working with their clientson both as needed and long term. VAs can be just about anyone, including at-home moms, individuals with disabilities, military spouses, and people who live in remote rural areas.

Source: *Business Education Forum*, December 2006

Economics by the Numbers

An accelerating pension gap is dividing the millions of baby boomers heading toward retirement into those have worked for government and those who have worked for private companies. The difference? Higher paying pensions and other benefits typically come from working in government.

- Retired government workers are twice as likely to receive a pension as their counterparts in the private sector, and the typical benefit is more generous because governments pump far more money into employee pensions than companies do.

- The nation's six million retired civil servants, who include teachers, police, administrators, and laborers, received a median benefit of $17,640 in 2004, according to the Congressional Research Service.

- In comparison, 11 million private-sector retirees covered by traditional pensions received $7,692.

- Civil servants earn an average of $12.38 an hour in benefits, about $5 an hour more than private-sector workers, according to the Bureau of Labor Statistics. The difference was just $2.70 an hour in 1995.

- Only 18% of private workers now have traditional defined benefit pension plans, compared with more than 80% of government employees.

- A typical full-time state or local government worker earned $78,853 in wages and benefits in the third quarter of 2006, $25,771 more than a typical private-sector employee, according to the Bureau of Labor Statistics. The difference was $7,604 in 2000. These numbers hold true for all types of workers, including teachers, laborers, and managers.

- The boost in government benefits since the 1960s reflects the rising power of public employee unions and the erosion of industrial labor unions.

Although the higher benefits allow retirees to have a better quality of life, there could be serious consequences for taxpayers and pensioners, according to a recent *USA Today* article, "Pension Tension." The U.S. government's unfunded retirement obligation grew $200 billion last year to

$4.7 trillion. Several states also have troubled retirement systems that may require huge tax increases, spending cuts, or defaulting on promised benefits.

Source: www.usatoday.com/news/nation/2007-02-20-pensions-cover_x.htm