# Sandia-developed ElectroNeedles may give diabetes patients a way to painlessly check glucose levels

## *Micron-sized µPosts can also monitor proteins released during a heart attack*

By Chris Burroughs

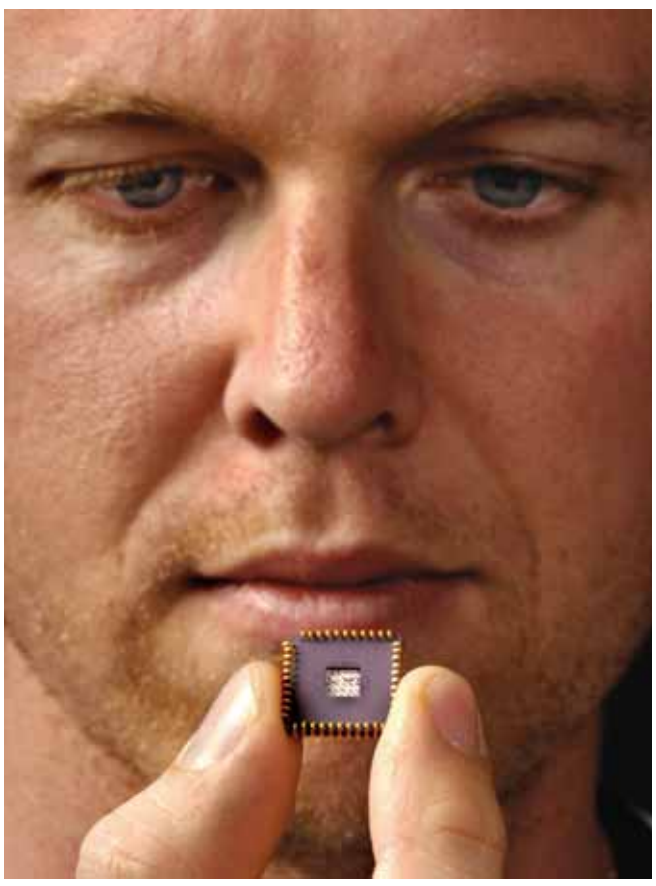
Two novel micron-sized devices recently developed by Sandia researchers could mean the elimination of blood drawing by diabetes patients to test glucose levels or by medical personnel to determine if someone is having a heart attack. Test results would be instantaneous.

The two operate similarly by penetrating painlessly into the skin. Tiny needles — arranged in varying numbers on a small patch — can measure molecules inside the body, eliminating the need to withdraw blood from a patient.

One platform is ElectroNeedles, micron-sized electrodes capable of measuring molecules such as glucose that can donate or accept electrons (redox behavior). The other is µPosts, micron-sized posts that have the potential of painlessly measuring proteins and other macromolecules, including protein markers released during a heart attack, using optical measurements. The platforms complement each other and create a diagnostic suite capable of detecting many important biological markers.

"The tiny ElectroNeedles, expected to be constructed of cheap throw-away plastic, will not only make glucose testing simple and painless, but significantly cut the diagnostics time involved in protein analysis," says Jeb Flemming (1744), project lead. "Because the analysis is done inside the body, the need to withdraw body fluid is eliminated, and because the needles are so small the measurements are painless."

Jeb and fellow researchers David Ingersoll (2521) and Carrie Schmidt (1763) came up with the idea for the ElectroNeedles and µPosts while working on the Laboratory Directed Research and Development (LDRD) Bio-MicroFuel Cell Grand Challenge where Jeb investigated harvesting sugars from living plants and animals. Some of that LDRD Grand Challenge money funded early ElectroNeedle and µPost work.



JEB FLEMMING, project lead for the ElectroNeedle platform, holds a test version of the device. The prickly parts are in the center of the package. A production version could be even smaller and simpler. (Photo by Randy Montoya)

It wasn't until they hired Colin Buckley (2521), a medical student from the University of New Mexico Medical School, that the team realized the magnitude of their invention. "Colin gave us a much-needed insight into the medical diagnostic field," says Jeb.

The team quickly realized that the tips of the ElectroNeedles and µPosts could be coated with a biologically active layer capable of measuring concentrations of specific lipids, proteins, antibodies, toxins, viruses, and carbohydrates (such as glucose). Using the ElectroNeedles and rapid electrochemical methods for analysis, a measurement can be made in a matter of a few seconds. Likewise, using the µPosts to capture proteins and other non-redox behaving molecules, optical measurements can potentially be made in under a half hour.

"Multiple chemical platforms, such as µPosts, will change medical diagnostics by giving the physician a greater understanding of the health of the patient in a shorter amount of time than standard laboratory analysis used today in medicine," Colin says.

The arrays may be configured in a variety of

*(Continued on page 4)*

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# Four R&D 100 Awards won by Sandia

## *Better tires, long-range image transmission, non-focused ion beams, and thermally stable foam take awards*

LYNDON PIERSON, left, and Perry Robertson, were among members of the team that earned an R&D 100 award for its work on Global Link. (Photo by Randy Montoya)

By Neal Singer

It's hard to imagine that where the rubber literally hits the road, you'll find Sandia Labs. But in this year's R&D 100 awards — awarded by teams of technical experts selected by Chicago-based *R&D Magazine* — there was Sandia, a joint winner with the Goodyear Tire and Rubber Company. The Labs' computational mechanics software was extensively applied by the company in the development of its new Assurance line of tires, particularly the TripleTred tire. Finite-element analysis was used to simulate and predict traction, wear, durability, and other performance characteristics of the TripleTred in bringing it from concept to market in less than a year.

*The sole criterion for winning is "demonstrable technological significance compared with competing products and technologies."*

Listed for special recognition at Sandia on the winning joint application are Martin Heinstein, Sam Key, Mark Blanford, and Ken Alvin (all 9142), Charles Stone (9127), Harold Morgan (9140), Greg Sjaardema (9143), Arlo Ames (15233), Deepesh Kholwadwala and Paul Wolfenbarger (both 15233), Bob Kerr (9226), and John Mitchell (2614).

### Global-Link

And there was Sandia again, using innovative data compression techniques to help physicians consult in real time on MRI pictures, though the amount of data transferred is normally huge and the healers may be thousands of miles from each other. Global-Link allows such rapid transmission of complex data that a doctor in the US can confer with a doctor halfway around the world, viewing and manipulating 3-D MRIs in realtime directly on each doctor's MRI computer. Similarly, oil team members can confer around the globe on observed data. So can military commanders. Extremely responsive

*(Continued on page 4)*

*11-year-old math whiz "really is a prodigy," says Sandia mentor. Story on* ***page 3.***

*Albuquerque Materials Camp teaches teachers new approaches to chemistry instruction. Story on* ***page 5.***

*Little pull-tabs help families in a big way at Albuquerque's Ronald McDonald House. Story on* ***page 8.***

# What's what

Scrubbed a bit, here from John Gould of the NNSA Sandia Site Office is a way to avoid falling asleep in meetings, seminars, and long conference calls.

Before the next one, divide a 5x5 card into five columns down and five across and write one of the following words/phrases in each block: synergy, strategic fit, core competencies, best practice, bottom line, revisit, take that off-line, 24/7, out of the loop, benchmark, value-added, proactive, win-win, think outside the box, fast track, result-driven, empower (or empowerment), knowledge base, at the end of the day, touch base, mindset, client focus(ed), paradigm, game plan, and leverage.

As the session drones on, every time you hear one of those words/phrases, check off the appropriate block. When you get five blocks horizontally, vertically, or diagonally, stand up and shout a word describing the end product of a healthy, grazing male bovine.

Guaranteed to keep you awake.

* * *

Winalee Carter (8511) was amused and puzzled when she found in her home mailbox recently an invitation from the American Express Small Business Network to apply for a business card. It was addressed to SANDIA NOTIONAL LAB.

"I don't know if Sandia should be upset because American Express thinks they are a 'small business' or if American Express thinks that I'm just thinking up a new lab from home," she mused.

* * *

Most of us grumble and complain about the high cost of gasoline today, but is it really "overpriced"? How you answer that will depend to some extent on your personal perspective, salary, tax bracket, and more, but you might find this observation interesting: There's an item in our "This Month in the Past" column in this issue about the rising cost of gasoline, pointing out that it was up to about 62 cents a gallon in July 1975. The Consumer Price Index (CPI) then was at 53.6. The CPI today is about 194.4, or 3.63 times that of 1975. And 3.63 times 62 cents is $2.25, which last week wasn't too far from the price for a gallon of regular unleaded fuel in Albuquerque ($2.33). So, is gasoline really overpriced? You make the call.

* * *

In today's world of complicated high-tech electronics and machines, low-tech approaches to fixing them are sometimes appropriate, according to colleague Larry Perrine. He cites two recent examples: First, after being told by a camera shop several months ago that his 1.3-megapixel digital camera with a stuck shutter was probably too old to make it worth the price of repair, Larry took it home, and decided to try something — whacking it down hard on the table. Sure enough, he pushed the shutter button immediately after that and it worked fine. Recalling that success about a week ago, he gave his two-year-old electric air compressor a healthy whack with a rubber hammer after it failed to start. That, too, did the trick, and both camera and compressor are still working fine, he reports.

*— Howard Kercheval (844-7842, MS 0165, hckerch@sandia.gov)*


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## Sympathy

To William Drotning (15232) on the death of his son, Eric Drotning, 24, June 20.

To John Sensi (6337) on the sudden death of his brother-in-law, Mark Anthony Sanchez, on July 11.

## Rob Leland appointed Director of Computing and Networking Center 9300

Robert Leland has been appointed Director of the Computing and Networking Services Center (9300).

Armed with a bachelor's degree in electrical engineering and a minor in mechanical engineering from Michigan State University, he attended Oxford University to study applied mathematics and computer science.


ROBERT LELAND

Earning his doctorate in parallel computing in 1989, he joined the Parallel Computing Sciences Department at Sandia in 1990. There he worked principally in parallel algorithm development, sparse iterative methods, and applied graph theory, coauthoring the widely praised computer code Chaco, a graph partitioning and sequencing toolkit used to optimize parallel computations.

In 1995 Rob served as a White House Fellow, advising the Deputy Secretary of the Treasury on technology modernization at the Internal Revenue Service.

Upon returning to Sandia in 1996, he led the Parallel Computing Sciences Department, an R&D group developing algorithmic technology and software tools in support of the Labs' supercomputing efforts.

For several years, he also served part-time as a member of Sandia's Advanced Concepts Group, studying long-term national security issues.

In 2002 he became the Level II manager responsible for Computer and Software Systems, a group of four departments developing supercomputing hardware, operating systems, meshing, and visualization technology. He remained there until his present appointment.

Says Rob, "I'm very excited about the opportunity to be part of Sandia's critical operational organizations. Information technology will be at the heart of any vital future for the laboratory."

## Labs Combustion researcher Jim Miller elected an APS Fellow

Jim Miller of Combustion Chemistry Dept. 8353 has been elected a Fellow of the American Physical Society "for advances in the theoretical chemistry of combustion processes."

Jim has worked at Sandia since 1974 and was an original developer (with Bob Kee) of the widely used CHEMKIN chemical kinetics software, which observed its 25th anniversary last year (*Lab News*, Oct. 15, 2004).


JIM MILLER

He received the Silver Medal from the Combustion Institute in 1990 for theoretical work on the extinction of opposed-flow premixed flames. However, he is best known for his work on the nitrogen chemistry of combustion and the gas-phase chemistry leading to soot formation. A 1989 paper by him on modeling nitrogen chemistry in combustion just passed 1,000 citations and is the most-cited paper ever to appear in a combustion journal. A 1992 paper is the most cited paper to appear in the journal *Combustion and Flame* in its history.

Jim has given plenary lectures at several conferences, including the 26th International Combustion Symposium. He serves on the editorial advisory boards of *Combustion and Flame, Journal of Physical Chemistry,* and *Theoretical Chemistry Accounts.*

## Feedback

**Q:** *There is yet another rumor that a VSIP will be offered. This time, "for up to 600 employees in the near future." Is there any truth to this rumor?*

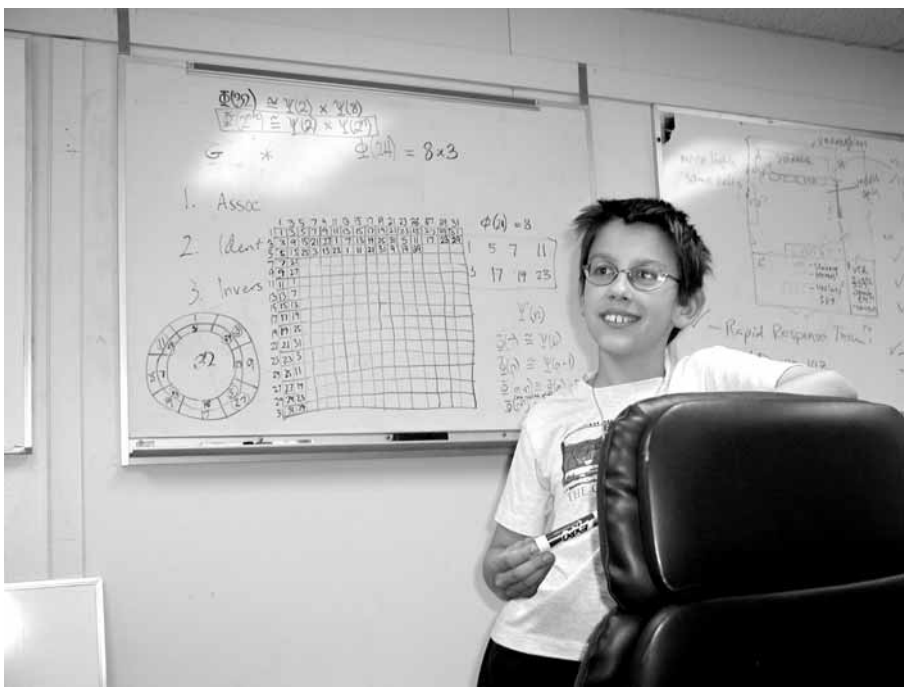
**A:** Sandia Executive Management continually monitors the actual and forecasted budget, revenue stream, and employment levels. There is no need for any employment reductions in force in the foreseeable future. There is no planning for any VSIP-like program. *— BJ Jones (3500)*

# Math mentors learn from Livermore-area student

By Nancy Garcia

Evan O'Dorney used to run around on his bed excitedly saying answers to addition flash cards at age 3. Now eight years later, at age 11, he is doing graduate-level math problems, often with some of the same boyish bounciness.

Evan came to Sandia for the first time when he toured in 2003 with other students who had won the regional Go Figure Math Challenge sponsored by Sandia. He came to the attention of the technical staff when he worked his way forward to the front of the group and began closely questioning the presenter on the mathematics behind cryptography at the Center for Cyber Defenders (CCD).



ABSORBING — Evan O'Dorney, 11, enjoyed discussing an arithmetic pattern he had observed during a recent visit to the Center for Cyber Defenders. (Photo by Nancy Garcia)

Ken Perano (8964) struck up a conversation with Evan's mother Jennifer and learned he was home-schooled like Ken's own children. That conversation evolved into a mentoring relationship in which Evan visits weekly for about an hour at a time.

With a background in engineering and applied mathematics, Ken creates software that manages design analysis codes for simulations of complex mechanical systems. He shared mentoring of Evan with Sandian Jesse Davis (who is currently on entrepreneurial leave). Head mentor Eilene Cross (8750) sits in monthly.

"I've learned a lot from him," Ken says. "His intuition is really excellent. He really is a prodigy."

His mother Jennifer, who comes along to take notes on the sessions, has a bachelor's degree in psychology and once was a math mentor. She says it is hard to know where Evan gets his flashes of intuition, but his love of math took hold as soon as he was introduced to the subject, and she has served primarily as a coach, learning how he thinks. "We've grown together in his education."

He just finished sixth grade through the home study program of Venture School in San Ramon, but passed his California high school exit examination last summer. He is concentrating on reading and composition and studying the Great Depression in US history, which complements his literature assignment, "To Kill a Mockingbird."

Besides math, his strengths include music (he composes on the piano and has perfect pitch), spelling (he has a photographic memory and came in 21st in last year's National Spelling Bee), and he enjoys tennis and Tae Kwon Do.

He's an only child but enjoys the company of younger children at parties, as well as relating well to adults.

On a recent visit to the CCD, he carried on a conversation with intern Kristen Pelon (8941) while presenting a chalk talk about a numerical pattern he had observed.

"Ring theory and group theory may be a cleaner way to solve this than number theory," she advised. Evan responded, "I'm just observing patterns and I don't know how to go about proving them." He had drawn two adjoining rows folded into a circle and divided into eight sections. In each section were numbers that are powers of two, which related in a patterned way with other numbers within the structure that he called a "magic prism."

Animated by the discussion, Evan moved back and forth between a stepping stool where he stood at the board and a nearby chair where he occasionally kneeled and swiveled.

Kristen asked if he'd studied abstract algebra. "It was a hard, hard class . . . which means you'll love it." He answered that he didn't have a textbook on it but it sounded interesting.

Ken gives Evan problems in advanced math, physics, engineering, and computer science each week. One source is the Tau Beta Pi engineering honors society magazine, *The Bent*, which publishes five problems each quarter and will run the names of anyone who solved them in the next.

"Every once in a while," Ken says, "he'll come up with an interesting result. I can give him a problem and he will have mastered it in a few hours. The rate at which he can see the significance of what you are teaching him is phenomenal."

Ken saw this one of the first days they met. He showed Evan Euler's equation, telling him that it can be used to derive most of the trigonometric identities. Evan looked puzzled so Ken hinted, "square it."

Ken recalls, "Half a second later his eyes lit up and he did two pages of calculations. This derivation is something that if you gave it to a room full of college math students, some of them may understand it in a couple of hours. He's doing graduate-level math at 11 years old and he's learning the concepts a lot more quickly than most graduate students would."

## Sandia CaliforniaNews


*This monthly column highlights* Sandia Lab News *items from 50, 40, 30, 20, and 10 years ago, but each column does not necessarily include items from each decade.*

**50 years ago** . . . Anyone still alive? The 10th anniversary of Trinity, the world's first test detonation of a nuclear fission bomb was noted in a big way in the July 15, 1955, *Lab News*. A front-page story described the blast in the south-central New Mexico desert, as an "unprecedented, magnificent, beautiful, and terrifying" detonation. Among several feature stories was an account by then Los Alamos Scientific Lab division leader Philip Belcher, who at the time of the July 16, 1945, explosion was an Army Intelligence lieutenant assigned to the Manhattan Engineering District. Observing the 5:30 a.m. blast from a window in the Albuquerque Hilton, Belcher noted a "tremendous flare of light in the southern skies. I wondered if anyone was still alive at Trinity." But up-close observers in a bunker 10,000 yards from the blast survived it fine with their backs turned to the initial blast to protect their eyesight. One such observer said the back of his neck felt scorched by the intense fireball.

CONTROL POINT — About 10,000 yards south of ground zero at Trinity Louis Jacot and Leo Jercinovic found the bunkers which were the heart of the operation. In the right foreground is the bunker where timing devices triggered the first atomic explosion. Ten years had deteriorated the construction very little.

**40 years ago** . . . Chewin' and pickin'— Back when Sandia's lunch periods were a full hour, many employees used the extra time for a variety of leisure activities, including card-playing, knitting, table tennis, horseshoe pitching, and napping. The July 2, 1965, issue featured a group of guitar pickers and singers (mostly technical artists) who gathered to "chew their sandwiches in rhythm as they plunk[ed] their guitars." Then highly popular folk songs also were sung at the daily "noontime hootenanny."

**30 years ago** . . . A July 25, 1975, story — "Gas Prices Rise Again" — encouraged Sandians to carpool or ride commuter buses to work. Although the Arab oil embargo had ended the previous year, new gasoline taxes were contributing to higher gas prices, up to a whopping 62 cents a gallon, and OPEC nations had scheduled another price increase for the fall. The story added, "Like it or not, you're going to be spending more for a gallon of gasoline that you're ever spent before. We won't see 1972 prices again." (Oh, how we could use some of that pricey 62-cent fuel today! But see related item in this issue's "What's What" column on page 2 about whether gasoline is really "overpriced" today in relation to the Consumer Price Index.)

**10 years ago** . . . Sandia's new Explosive Components Facility (ECF), dedicated July 6, 1995, made it possible to conduct high-explosives testing indoors. Located just southeast of Technical Area 1, the ECF replaced outdoor explosives testing facilities in Area 2 that had been used since the 1940s. Explosive Projects/Diagnostics Manager Lloyd Bonzon said the new facility "really supports our cradle-to-grave mission for nuclear weapons." Among many other new facilities and equipment, the ECF included a lab housing a 56-foot gas gun capable of launching projectiles at explosive materials at speeds approaching one mile per second and eight reinforced concrete vaults containing "ovens" used to accelerate aging processes on nuclear weapon components.

WORKERS lower one of two 33-ton walk-in blast chambers through the roof of the ECF firing bay.

*—Larry Perrine*

# R&D 100

(Continued from page 1)

interactions between an event and a remote, secure, high-resolution display of it are possible using Global-Link across the Internet. Involved from Sandia are Perry Robertson (1751), Lyndon Pierson (5616), John Eldridge (9336), Ron Olsberg (5616), Larry Pucket (2993), and Ed Witzke (9336). Results were achieved in collaboration with Logical Solutions, Inc.'s Ross Capen, Kevin Keefe, and Mark Remlin. The company is marketing the product.

### Ion-Photon Emission Microscope

A third R&D 100 award was earned for an exploratory ion beam system that does not require costly and complicated forming and focusing equipment. The system was invented and patented by Barney Doyle (1111), jointly with Mike Mellon of Quantar Technologies, which is marketing this invention.

The multidimensional, high-resolution analysis system is called the Ion-Photon Emission Microscope (IPEM). It allows scientists and engineers to microscopically study the effects of single ions in air on semiconductors, semiconductor devices, and biological cells without having to focus the beam. The technique determines the position at which an individual ion enters the surface of a sample; thus, focusing a beam is unnecessary.

The machine's capabilities are identical with traditional single-ion nuclear microprobe analysis. It maps charge collection and other single-ion induced effects, such as logic upsets, in semiconductor and/or microelectronic devices. But expensive accelerators normally required can be avoided through use of radioactive sources. Also, because this full-field microscope uses light produced by the ions, IPEM can be performed in air, which is a requirement for diagnostic systems used for Radiation Effects Microscopy on large cyclotrons.

Also included on the award are Paolo Rossi of the University of Padova, Italy, and Floyd Del McDaniel of the University of North Texas, who both worked with Barney during sabbaticals at Sandia on the development of the IPEM. This is Barney's third R&D 100 award, and his department's fifth.

### TEPIC structural foam

Last but not least, TEPIC is a rigid structural foam developed at Sandia/California that was designed originally to meet certain high-temperature and high-strength requirements for Defense Programs applications. Because it is dimensionally and mechanically stable to temperatures in excess of 200 degrees C, it meets processing requirements to be used as molding forms for advanced composite materials that cure at high temperatures. Formerly, only expensive metal tooling could meet this thermal challenge. Unlike many more conventional tooling materials, it can be processed in thick sections. Cost and weight savings should allow smaller businesses, with less capital investment, to process new composite structures, and in general enable incorporation of advanced structural composites in aerospace, military, automotive, and other consumer product industries.

Team members include Steve Goods (8754), and LeRoy Whinnery, Tom Bennett, Pat Keifer, Chris Binns, and Tim Shepodd (all 8762). Also included on this award is Jim Sampson of Scion Industries, one of 2 licensees of TEPIC.

TEPIC CAN BE MACHINED using a variety of common tools including: fly cutter (shown), mill, lathe, bandsaw, and sander.

*"These awards demonstrate that DOE scientists and researchers are hard at work developing the technologies of the future. In the past, breakthroughs like these have played an important role in both our economic and national security."*

**Secretary of Energy Samuel W. Bodman**

*"Sandia's mission and values should always lead to a positive impact for our country. There is no better evidence for that than national recognition for our contributions to science and technology. The R&D100 Awards are not only an important benchmark for our contribution, but a clear statement about our excellent work and that it matters. As we are proud of all our staff at Sandia, the R&D100 Awards allow us to be especially proud of the four winning teams this year."*

**Sandia Labs President and Director Tom Hunter**

## *R&D 100 awards are the 'Oscars of invention'*

The annual contest attempts to select the best applied new technologies. One hundred winners are chosen from an international pool of contestants from universities, private corporations, and government labs.

Sandia often wins many of its awards in partnership with private companies, other labs, or universities. Recent emphasis on technology transfer has boosted the number of joint submissions.

The R&D 100 Awards — occasionally referred to by pundits as "the Nobel Prizes of technology" — were first awarded in 1963 as the I-R 100s, in keeping with the original name of the magazine, *Industrial Research*.

Many entries over the ensuing years became household names, including Polacolor film (1963), the flashcube (1965), the automated teller machine (1973), the halogen lamp (1974), the fax machine (1975), the liquid crystal display (1980), the printer (1986), the Kodak Photo CD (1991), the Nicoderm antismoking patch (1992), Taxol anticancer drug (1993), lab on a chip (1996), and HDTV (1998).

The sole criterion for winning, according to a description released by the magazine, is "demonstrable technological significance compared with competing products and technologies." Properties noted by judges include smaller size, faster speed, greater efficiency, and higher environmental consciousness.

The magazine has responded to new technologies by creating additional categories. Winners have been chosen in the fields of analytical instruments and processes, electronics, testing and measurement, software, environmental technology, and advanced biomedical devices and systems.

Winners are presented plaques at a formal banquet in Chicago in early fall. — *Neal Singer*

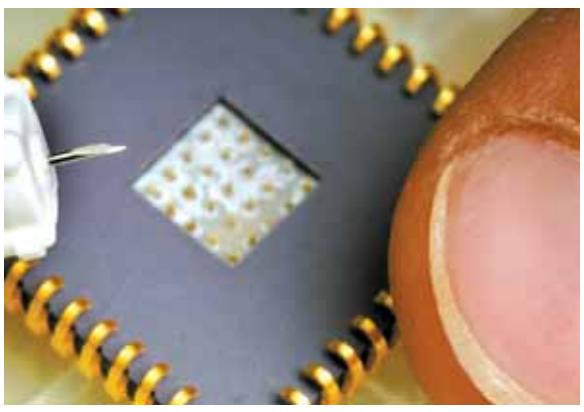
# ElectroNeedles

(Continued from page 1)

formats — larger or smaller to customize for given applications.

The ElectroNeedles and µPosts can be tailored in size to sample in different portions of the skin. For example, they can be made shorter to measure small-molecular-weight compounds such as glucose in the upper layer of the skin, or they can be made longer to measure larger molecules in the blood, such as Troponin I, a key protein released when a person has a heart attack.

"Today if someone goes to an emergency room with chest pains the doctor assesses the patient's condition based upon their symptoms. In order to accurately diagnose a patient, the doctor has to take a blood sample, which is typically sent to an off-site laboratory for analysis," Jeb says. "The person usually has to wait six hours to get confirmation on whether they have elevated Troponin I levels indicating they have had a heart attack."



STANDARD needle for diabetes blood testing (on left), vs. an ElectroNeedle configuration. Which would you prefer? (Photo by Randy Montoya)

With a µPost test a doctor would know within a couple of minutes of a patient's arrival at the emergency room if the patient has elevated Troponin I levels, as most of the diagnostics can take place inside an ambulance during a patient's trip to the hospital.

"There would be little to no pain associated with this," Jeb says. "The only thing the patient would feel is a slight itching."

ElectroNeedles and µPosts now exist as a prototype and are made of Foturan®, a glass-like material. The intent is to ultimately mass-produce them in an inexpensive plastic.

The devices have been used to measure glucose and Troponin I within pigskin, with the next step to test them on pigskins with blood.

The technological advances the team has made have led to several patents pending.

### The ElectroNeedles team

**Members of the ElectroNeedles team include: Jeb Flemming (1744), project lead; David Ingersoll (2521), Colin Buckley (2521), Carrie Schmidt (1763), and Stan Kravitz (retired).**

# Fast-moving fire draws even faster response from Sandia, KAFB

JENNIFER PAYNE of Environmental Management Dept. 6331 took these photos on the early evening of Thursday, July 14, as lightning-sparked fires swept across tinder-dry grass near Sandia's Robotic Vehicle Range. Emergency personnel from Sandia and Kirtland Air Force Base responded to this fire and another grass fire south of Area 3 on Isleta Pueblo. During the fires, several Sandia facilities were evacuated, including the RVR, Tech Areas 2 and 4, and Bldg. 905. Some employees in Tech Areas 3 and 5 were sheltered in place temporarily until they could be safely evacuated. About an hour and a half after the fires started, they were extinguished. By 7:30 p.m. the employees who were sheltered in place were safely evacuated from Areas 3 and 5. By Friday morning operations were back to normal.

# ASM holds third annual materials camp for teachers

## *Workshop experience spearheaded by Sandians leads to new APS course*

By Elizabeth Malone

Pots simmer, expanding foam creeps over the side of a paper cup, and Borax combines with polyvinyl alcohol to make slime. It is polymer day at the American Society for Materials International (ASM) Albuquerque Materials Camp where teachers are playing students.

From June 26-July 1 at Eldorado High School, 30 high school teachers from New Mexico and across the nation had a chance to experiment hands-on with materials science.

Sandians J. Bruce Kelley (6245) and Don Susan (1813), chairs of the Albuquerque ASM chapter, spearheaded the organizational aspects.

"By teaching the teachers we can reach more kids," says Bruce. "The workshop organizers do this because they have hearts for teaching science to the next generation."

Their passion for science includes saving chemistry from a bad rap.

"A lot of students say they hated chemistry," says Pat Duda of Cibola High. "They ask, 'When will I ever need this? How is it relevant?'" Duda, one of three local teachers conducting the workshop, wanted to involve students in materials science technology and answer those questions.

Under the direction of ASM members, Duda and fellow teachers Margaret Showalter of Eldorado High and Ellen Loehman of Jefferson Middle School led experiments. Other Sandians giving presentations included retiree Ken Eckelmeyer, who gave the opening talks, Mike Hessheimer (6864) on testing nuclear reactor containment structures, Rob Sorenson (6142) on corrosion on basic electrochemistry, Jill Glass (1825) on glass and ceramics, and Jim Aubert (1821) on polymer structure and properties.

"Sandia gives depth and a link to how techniques are used," says teacher Donna Jernigan of Albuquerque High.

After the talks and demonstrations, participating teachers pulled on gloves to explore topics themselves.

"We look at the macroscopic properties to see what on the microscopic and atomic scale corresponds," says Loehman. Each day focused on one of four main division: metals, ceramics, polymers, and composites. To learn about raku on ceramics day, participants bisque-fired clay, applied glaze containing metal oxides, and again fired the clay to trigger an oxidation-reduction reaction.

"I have been so excited by using everyday items to experience chemistry," says Advanced Placement chemistry teacher Dolores Salazar. She plans to incorporate the camp's labs, ideas, and philosophy into her Rio Grande High School classes. In addition to chemistry teachers, the camp attracted Explora staff and an inclusion/special education teacher.

Lockheed Martin/Sandia, the National Science Foundation, and ASM's Los Alamos and Albuquerque chapters sponsored the camp. All teachers received a full scholarship to cover tuition, supplies, and room and board.

Al Romig, Sandia Deputy Director for Integrated Technology Programs who has led Lockheed Martin/Sandia's financial support for each of the local workshop's three years, says, "The energy and passion these teachers already had was remarkable. Our goal was to enhance this — to help teachers take science and wrap it up in something students can touch in everyday life, and to help students see the materials components in sports, cars, airplanes, electronics, and biomaterials."

"The camp appears to be helping teachers interest the students in careers in materials science and engineering," he says. "We're gratified that as one result of the camp, APS has recently approved a high school materials course for its students."

This coming school year, more than 600 high school students plan to take the course, which has been developed by ASM and Sandia members, APS teachers, and various university professors based on their experiences in previous years' camps. The course is rigorous and meets standards, the teachers emphasize, but has a different focus. As the first APS materials science course, it is one of only a few in the country. Eleven APS teachers who will be teaching the course attended the workshop.

"In a regular chemistry course, you're concerned about all the traditional things such as stoichiometry and gas laws. Here, your approach is a little different," says Chris Hilleary, who will teach the new course at Sandia High. "Materials science teachers need to strike a balance in their classroom and be sure to cover the concepts and address standards to understand the chemistry behind what they're doing." He hopes the new course will engage different kinds of learners.

STRANGE BREW — Albuquerque High School science teacher Donna Jernigan observes characteristics of a slime mixture. (Photos by Amy Tapia)

PARTICIPANTS in the Albuquerque Materials Camp enjoy hands-on materials science experiments that they can, in turn, share with their own students. The camp is sponsored by local chapters of the American Society for Materials International. Several Sandia volunteers helped coordinate the event.

# Mileposts

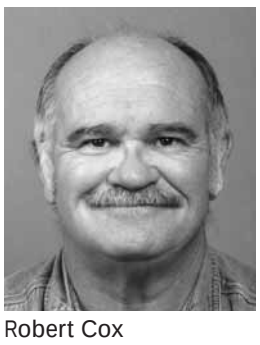
*New Mexico photos by Michelle Fleming*
*California photos by Bud Pellitier*


Rich Gay
40 8949


Bill Camp
35 9200

## Recent Retirees


Millie Griffo
26 12655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Lucille Garcia
35 2023


Jose Gonzales
35 14422


Robert Bradshaw
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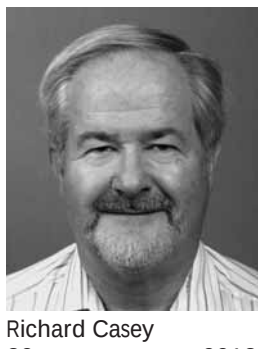
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Sylvan Benjamin
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Steve Brandon
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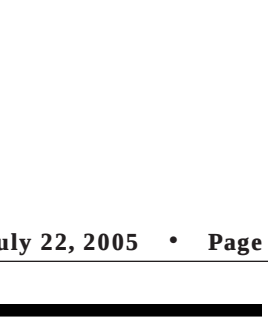
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Rex Eastin
25 8232


David Klassen
25 12300


Joel Miller
25 9326


Lisa Ann Mondy
25 9114


Ronald Price
25 6855


Paul Veers
25 6214


Donald Waye
25 0247


Dean Williams
25 8945


Karen Current
20 14421


John Herzer
20 5631


Paul Montoya
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Bradley Nation
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Arthur Salazar
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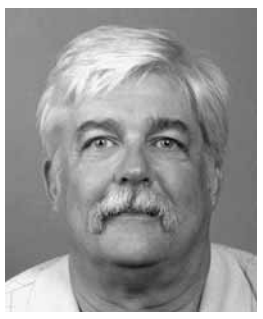
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Stephenson Tucker
20 15241


John White
20 15416


Mary Campos
15 1050


John German
15 12651


John Hoffman
15 12345


Jeffrey Kalb
15 2621


Rob Leland
15 9300


Jacqueline Ramirez
15 2800


Peter Stromberg
15 2332


Sheryl Vahle
15 5057


Jose Vigil
15 2565


Walter Witkowski
15 9133

## For the record

An article in the July 7 *Lab News* titled "New employee injury notification process in place" incorrectly identified the level of person responsible for a report about an on-the-job employee injury and providing it to Labs Director Tom Hunter and the ES&H director. The person responsible is the Senior Manager, formerly called Level II manager, not the Level I manager.

# Pull-tabs from soft drink cans help fill cabinets in the 'House that love built'

By Iris Aboytes

TINY CHRISTIAN TIRADO, whom his mother Traci calls her "one-pound miracle," was born on Mother's Day 2005, more than 12 weeks premature. While Christian continues to receive medical treatment, his family has stayed at the Ronald McDonald House. Sandia's Office Professionals' Quality Council community outreach team has coordinated collection of aluminum soft drink pull-tabs at the Labs. Sandia and other participating agencies have collected more than 1,800 pounds of tabs this year alone, translating into $812.65 for the Ronald McDonald House. (Photos by Randy Montoya)

Grace (Traci) Tirado received an unexpected gift on Mother's Day, Christian Elijah. She refers to her gift as her "one-pound miracle." Born at 24 weeks, he weighed one pound and was $10^1/_2$ inches long. "He is just beautiful," says Traci.

"Christian is progressing right on schedule, according to the charts," she says. "We are so thankful and grateful. He now weighs two pounds, four ounces and is $14^1/_2$ inches long."

While Christian is in the hospital, Traci, her husband Tito, and their 14-year old daughter Samantha are residents at the Ronald McDonald House (RMH).

RMH is an 18-bedroom facility founded in 1982 to provide a temporary "home-away-from-home" to families with critically ill or injured children who must travel to Albuquerque. Traci and her family are from Carlsbad. According to Stella Lavis, volunteer and events coordinator, the Ronald McDonald House is not a hotel or a motel, but a warm and caring home-like environment where families sleep, prepare hot meals, and can be close to their ailing children.

Sandia's OPQC (Office Professionals' Quality Council) Community Outreach Team coordinates collecting pull-tabs from soft drink cans for RMH. Members of the Council have placed the little boxes at OAAs' (Office Administrative Assistant) workspaces and other common areas supported by employees. This allows Sandians a convenient and easy way to deposit them. Some Sandians even bring their pull-tabs from home.

When the boxes are full, the tops are mailed to Linda Chappell (14154, MS1245). She takes them to RMH. That converts to groceries, cleaning supplies, etc. for their guests. According to Lavis, 1,889 pounds of pull tabs have been collected this year. That translates to $812.65. That total is not just from Sandia but from all participating agencies.

BABY MAKES FOUR — Tito and Traci Tirado with their children, Samantha, 14, and newborn Christian.

The RMH has a Family Dinner Program where volunteers provide food and prepare meals for the guest families.

"I am at the hospital so many hours," says Traci, "I have no time to cook. It is great to get back and find food prepared by the wonderful volunteers. There are rules that the residents follow and keep the facility clean. It is a blessing for my family to be able to stay there."

Samantha was adopted over a year ago. "She had no family that could take care of her," says Traci. "When we first met her it was just like in the *Jerry Maguire* movie, she had us at 'hello.' She was truly sent from God. She gives me strength as she writes letters to her baby brother. She really loves him. My husband says she 'takes a lemon and makes lemonade.'"

Traci and her family are just one of the more than 30,000 families who have called RMH their home away from home. A small army of community volunteers, from college students to retirees, physicians to children, have cooked, cleaned, computerized, raked, weeded, listened to, and cared for families.

"It is because of these volunteers that the Ronald McDonald House is truly the 'House that love built,' " says Lavis.

"Helping comes in all levels," says Linda. "Make a difference today by depositing the pull tabs in the little boxes. Think of the families that are in need of our help. Each of those families has a child in the hospital."

For more information on the Ronald McDonald House, or to find out other ways to help, call Stella Lavis at 925-2220 or visit their website — www.rmhc-nm.org

If your department does not have a box to collect the tops, contact Carmen Good (6030) at 844-8266.

## Cookin' with Ronald McDonald

Corporate Education, Development & Training Organizations (3520-1, 3521, and 3522) cooked a meal for Ronald McDonald House in December, as one of their holiday community service projects. Employees enjoyed it so much they decided to continue to furnish meals for the House residents on a routine basis throughout the year.

"It is fun," says Jodi Case (3521). "First we come up with a theme and then we circulate a list of needed groceries. Some donate food items and others cook at the site. It is a good opportunity for our staff to work together as a team and the House residents are very appreciative."

SANDIA VOLUNTEERS and family members after preparing dinner for the Ronald McDonald House. Shown here left to right are: Sarah Atchison (3521), Christina Chavez (3521), Jacob Chavez, Kiana Stamps (3331), and Linda Jaramillo-Alfaro (3521).

For information contact Stella Lavis at 925-2220 or call Jodi at 844-8559. — *Iris Aboytes*

## *Forklift Rodeo an uplifting event*

GRAND HOOP — John Ledet (6337) scores two points during finals of the 5th annual Forklift Safety Rodeo July 14. John is this year's grand champion. He was among 74 Sandians participating in this year's event from 11 organizations. Other winners included Rudy Navarro (42331), best male operator; Maxine Baca (102632), best female operator; Greg Vigil (102681), 2nd place overall; and Pete Nieto (108432), 3rd place runner-up. The goal of the rodeo is to demonstrate operator skills. Event co-organizer Liz Carson (10262) says the rodeo offers "a great deal of camaraderie, morale, and great competition." (Photo by Randy Montoya)