Diamond plates create nanostructures through pressure, not chemistry

By Neal Singer

You wouldn’t think that mechanical force — the simple kind used to eject unruly patrons from bars, shoe a horse, or emboss the raised numerals on credit cards — could process nanoparticles more subtly than the most advanced chemistry.

Yet, in a paper published June 24 in Nature Communications, Hongyou Fan (1815) and colleagues appear to have achieved a start toward that end.

Their newly patented and original method uses simple pressure — a kind of high-tech embossing — to produce finer and cleaner results in forming silver nanostructures than do chemical methods, which are not only inflexible in their results but leave harmful byproducts to dispose of.

Hongyou calls his approach “a simple stress-based method.”

(Continued on page 4)

SANDIA RESEARCHER HONGYOU FAN (1815), center, points out a nanoparticle result to Sandia paper co-authors Paul Clem (1816), left, and Binsong Li (1815). (Photo by Randy Montoya)

Engineered Safety

Repackaging waste drums: Understanding the technical basis

By Sue Major Holmes

Removing prohibited items from five waste drums from an outside institution meant three weeks of work for Sandia’s Non-Reactor Nuclear Facilities Org. 1387, but eight months of planning, facility modifications, and reviews.

Eight of 30 containers from the outside organization didn’t meet the criteria for disposal. Five drums needed glovebox handling and two of those were hazard category 3. That kind of repackaging had to be done at the Lab’s Radioactive and Mixed Waste Management Facility (RMWMF) — but it wasn’t approved for the higher hazard category.

RMWMF went through a formal DOE process to get a temporary exemption to repackage the waste. Sandia modified a glovebox, adding a special HEPA filter, fire suppression, and puncture-resistant gloves.

"The gloveboxes added the engineering controls above what [Tech] Area 5 could provide," says manager Jeff Jarry (4144).

Readiness review

The facility also performed a readiness review, including mockups with clean material to demonstrate the process step-by-step, and gave a tour and briefing on the planned work to the Defense Nuclear Facilities Safety Board.

The project was a success. The material is now buried at the Waste Isolation Pilot Plant near Carlsbad.

During repackaging, Sandia’s team even removed some valuable radioactive material so it could be used. "If you can’t control a hazard, you have to mitigate the hazard," says Mike Spoerner (1387), who was project lead at the time under Jeff. "You want to provide Engineered Safety to mitigate those risks. We know that all of them can’t be engineered, so there are also administrative controls you can put in."

Although the 2011 project occurred before Sandia’s formal adoption of Engineered Safety, Jeff says it had an Engineered Safety flavor in understanding the technical basis for work being done. "Risk analysis is what you’re doing. You identify all your risk points," Mike says.
That's that

I was forced to pass along something that happened to me this morning that may have some value as a cautionary safety story.

While driving to work on the Central Avenue extension of the Sandia Boulevard, I was stopped at a traffic signal. The light was red, so I pulled to the side and stopped. Just as I did, a white pickup truck was also stopped, with its brake lights on. I was able to stop and wait for the traffic light to change. As I waited, I noticed that the pickup truck was in the left lane, which was also the turn lane. I then observed that the driver of the pickup truck was looking around and seemed to be searching for something. Suddenly, the driver accelerated and moved into the right lane, which was occupied by a white sedan. The driver then cut off the sedan in the right lane, forcing the driver to brake suddenly to avoid a collision. The driver of the pickup truck then turned right and drove away.

This incident was a reminder of the importance of being aware of one's surroundings while driving. It is essential to be vigilant and to be prepared to react appropriately in case of unexpected situations. It is also important to be considerate of other drivers and to avoid cutting them off. Overall, this incident serves as a cautionary tale to drive responsibly and to be mindful of others on the road.
DHS Transition to Practice program

By Mike Janes

Through the Department of Homeland Security's Transition to Practice (TTP) program, cybersecurity technologies — and those of the other DOE labs — now stand a better chance than ever of finding their way into the real world. The TTP, spearheaded by the department’s Science and Technology Directorate, is an innovative program specifically created to assist in moving federally funded technologies developed at Sandia and other laboratories into the hands of industry, academia, and other research institutions that can really use them. And this is a monumental task. DOE and DoD labs — now stand a better chance than ever of

DHS’s TTP, spearheaded by the department’s Science and Technology Directorate, is an innovative program specifically created to assist in moving federally funded technologies developed at Sandia and other laboratories into the hands of industry, academia, and other research institutions that can really use them. The TTP’s methodology is straightforward. DHS’s Mike Pozmantier, the program manager for TTP in the department’s Cyber Security Division, conducts events across the country each year that feature cyber technologies developed at DOE and DoE laboratories and selected from Sandia. The events are targeted to specific sectors and audiences; one, for instance, has been held in Washington, D.C., for potential users in the federal government, while another was held in northern California’s Silicon Valley for high-tech audiences. Other events target startups interested in moving federally funded technology into the hands of business and include one hosted by Sandia for the financial sector and another this year focused on energy. The goal is to create business opportunities, initiate conversations, and enable relationship-building that will advance partnerships and the development of important cyber technologies, including some developed within Sandia, into practice. That could be accomplished through pilot programs with industry, licensing, or spinning off of technologies into startup companies through venture capital funding, but the first hurdle is to identify, test, and evaluate the usability and overall viability of the technologies.

Sandia serving key testing and evaluation role

In addition to considering Sandia-developed cyber technologies for transition, DHS is leveraging Sandia’s cyber expertise to test and evaluate (TTP) technologies developed by other DOE and DoE labs. Steve is leading the effort, with key contributions coming from colleagues with the assurance that he or she will be able to hand it to a smart technical team when looking at the commercial feasibility of technologies — including those developed at Sandia. “An additional benefit to the TTP test and evaluation work is that we’ve actually learned some things that can improve our own processes here at the Labs,” Steve adds. “We now realize that we need to start at the very beginning when looking at the commercial feasibility of technologies — including those developed at Sandia.”

“Though it might seem obvious, we’ve learned that even the simple question of whether a cyber invention works or can be easily installed by an end user needs to be evaluated,” Steve says. “Someone who is developing a technology should be able to hand it to a smart technical colleague with the assurance that he or she will be able to easily and efficiently set it up and use it. If the program is too complicated or complex for that to occur, then it’s probably a non-starter. That’s the lesson for Sandia as well as the technology involved in the TTP initiative.”

The test and evaluation team also examines the cost of implementation and whether there are new problems or risks associated with each technology it evaluates. “Maybe the product successfully addresses some problem. But if the developer knows from experience that adding new computer security is not like building another fence,” Susanna says. “What is intended to add additional security to a computer can actually be counterproductive and break the existing security system. These things have to be considered very carefully.”

Long-lasting value

In TTP’s kickoff year, three cyber technologies were selected from Oak Ridge, two came out of Pacific Northwest National Laboratory, and one each was selected from Sandia, Lawrence Livermore, and Los Alamos national laboratories. The TTP expanded its reach to DoE labs as well as the DOE labs, two Sandia technologies were selected. The TTP initiative is really helping Sandia get its cyber technologies to those organizations that need them to better protect their assets,” says Steve. “And we also see it as a way to leverage our testing and evaluation capability, since we truly believe no one else is as good at this particular job,” he continues. “It’s somewhat under the radar and not very visible, and it has been a learning experience to apply our processes to developmental rather than operational technologies. But many of these cyber technologies around the national lab complex will be stronger and more mature due to our test and evaluation support. Ours is a vital role.”

The hope, Steve says, is that Sandia’s value becomes so clear and recognized by other national labs that they’ll begin to approach us independently of the TTP program, and ask us to provide test and evaluation services. Though that will likely be a challenge due to natural rivalries or perhaps even detain them from integrating us, Steve adds, “and others at Sandia are confident it can happen. We’ve got to get lengths to avoid conflicts of interest. We offer an unobtrusive presence, and unbiased, third-party assessment of technologies, and we do so in a way that incorporates both technical skill and an objective, fair mind-set,” says Steve.

To further avoid con-

flict-of-interest issues, says Steve, Sandia intends to host other independent participation, in part to leverage the TTP methodology being used throughout the program. For instance, Exelixis, a technology company that provides mission-critical, next-generation solutions for the command, control, communications, computer, intelligence, surveillance, and reconnaissance markets, led the TTP activities around Sandia’s CodeSeal technology. A third party would also likely be used in cases where Sandia is faced with evaluating a technology that competes directly with one of its own technologies — and those of the entire community, no matter which lab has developed it, and we are pleased to draw on Sandia’s broad and deep cybersecurity expertise to develop new technologies and also to make those of the entire community stronger.”

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Nanostructures (Continued from page 1)

fabrication method" that, when applied to nanoparticle arrays, forms new nanostructures with tunable properties. “There is a great potential market for this technology,” he says. “It can be readily and directly integrated into current industrial manufacturing lines without creating new expensive and specialized equipment.”

Says Sandia co-author Paul Clem (1816), “This is a foundational method that should enable a variety of devices, including flexible electronics such as antennas, chemical sensors, and strain detectors.” It also would produce transparent electrodes for solar cells and organic light-emitting diodes, Paul says.

The method was inspired by industrial embossing processes in which a patterned mask is applied with high external pressure to create patterns in the substrate. Hongyou says, “In our technology, two diamond anvils were used to sandwich nanoparticulate thin films. This external stress manually induced transitions in the film that synthesized new materials,” he says.

The pressure, delivered by two diamond plates tightened by four screws to any external loading, creates silver nanospheres of any desired volume. Propinquity creates conditions that produce nanowires, nanosheets, and nanosheets at chosen thicknesses and lengths rather than the one-size-fits-all output of a chemical process, with no environmentally harmful residues.

Starting to work with nanostructures

While experiments reported in the paper were performed with silver — the most desirable metal because it is the most conductable, stable, and optically interesting and becomes transparent at certain pressures — the method also has been shown to work with gold, platinum, and other metallic nanoparticles. Paul says the researchers are now starting to work with semiconductors.

Bill Hammerter (1815), manager of Sandia’s Advanced Materials Laboratory, says, “Hongyou has discovered a way to build one structure into another structure — a capability we don’t have now at the nanolevel. Eight or nine gigapascal — the amount of pressure at which phase change and new materials occur — are not difficult to reach. Any industry that has embossing equipment could lay a film of silver on a piece of paper, build a conductive pattern, then remove the extraneous material and be left with a single viewgraph to help engage potential customers in discussions to clarify expectations and prevent misunderstandings.

The scale described five different “types of prototypes.”

1. Research Demo — Experiment on a lab bench: come in, use it, see if it works, and we will demonstrate it for you.

2. Research Prototype — Looks like a product, hand built by PhDs, breaks a lot.

3. Engineering Prototype — Research Prototype that is rugged and repeatable.

4. Flight or Field Prototype — Engineering Prototype that is reliable and manufacturable.

5. Production Prototype — Flight or Field Prototype that has cost “wrong out” (if applicable) and has completed qualification.

As the manager reviewed the scale with the visiting engineers, he read the definition of Research Prototype: “Looks like a product, hand-built by PhDs, breaks a lot.” The visiting team roared with laughter. When the laughter quieted down the manager asked the visitors why that was so funny. They replied, “That happens to us all the time.” The manager responded, “That is exactly the reason we have this scale. In the past we had some disappointed customers because we delivered the wrong type of prototype. The fact is, we have customers in different business situations and each of these five prototypes is optimal for different business situations. The failure mode that used to occur is that we would think a customer was asking for one type of prototype but they were really expecting a different one. Today, we use this scale to make sure we don’t do that to you.”

This five minutes of dialogue, precipitated by the use of a simple prototype scale, did more to move the trust level with these visitors to a high level than a full day of technology briefings would have and quickly resulted in funded projects.

Moral of the story

“The failure mode that used to occur is that we would think a customer was asking for one type of prototype but they were really expecting a different one.”

When you agree to deliver a prototype be aware that there are many different types and it is easy to work hard, deliver the prototype, and greatly disappoint the customer if you don’t have a way to clarify and manage the customer’s expectations on this. Use a one page “prototype scale” to facilitate dialogue with potential customers and get clarification on what type of prototype best meets their needs.

Research Quality Standards case studies

What type is your prototype?

Note: Sandia recently published a new Research Quality Standards document that, rather than providing a step-by-step set of requirements, focuses on case studies to define best practices in the world of research. Here is one case study drawn from the 50 in the document.

A team from a major US manufacturer was visiting Sandia to investigate the possibility of using Sandia technology in a new product needed for the manufacturer to meet upcoming regulatory requirements.

Because these were product-oriented customers who wanted to get to a useful product as soon as possible, the Sandia research manager knew the issue of prototypes and their delivery would have to be addressed quickly. This manager had learned (the hard way) that trying to work with their project manager without addressing the issue first would result in a delivery delay. This manager and that to deliver the wrong type of prototype could end the relationship. To address this failure mode, the manager developed a scale describing type of types of prototypes their customers found value in (in different business situations) and had written the scale down in a single viewgraph to help engage potential customers in discussions to clarify expectations and prevent misunderstandings.

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Engineer scores with soccer science book

By Valerie Larkin

I

If you follow soccer, you’ve probably heard the term “Messi magic.” That’s how fans and writers describe some of the impossible things Argentine superstar Lionel Messi is able to accomplish with a soccer ball. But when Messi cuts a ball into a goal from a corner, there’s more than magic at work; there’s a lot of science at play in the playing field. In his latest book, *The Science of Soccer: A Bouncing Ball and a Banana Kick,* Sandia retiree John Taylor explores the myriad scientific concepts you’ll see on display during a soccer match . . . if you know how to recognize them.

**Soccer as scientific panorama**

“Soccer is more than just a fascinating mobile chess match,” the former referee and Stanford University soccer captain writes. “It is also an endless scientific panorama.” Published by the University of New Mexico Press, John’s book is written for middle and high school students interested in such scientific aspects of soccer as physics, kinesiology, biomechanics, biochemistry, and fluid mechanics. The book describes soccer’s history, including the recent development of soccer science, and then delves into two key elements of a match: the way the players interact with the ball through kicks, headers, and tactical maneuvers; and the way the ball behaves on the pitch and in the air.

Writing *The Science of Soccer*

The book features several experiments John devised for readers who want to see the science behind the popular “bend it like Beckham” phenomenon: “If a player hits the ball on one side or the other, he or she can induce sidespin. Using sidespin, the Magnus effect — the combination of differential pressure and momentum transfer that causes an object to curve in flight — will cause a ball to bend around a wall.” This ability to “bend” the ball’s flight becomes important when a player needs to angle the ball around other players and into the goal.

Appendices offer the calculations behind scenarios discussed in the text such as the trajectory and height of a punt, the time and curvature of a free kick, and even the calories a player burns by sprinting toward a ball. The book features several experiments John devised for readers who want to see concepts such as viscosity, air flow patterns, and spin in action. Developing the experiments was especially enjoyable, John says. He envisions students conducting these experiments at school and exploring science fair ideas because they require so few materials.

**Science on display in 2014 World Cup**

Science has been a popular theme during the 2014 FIFA World Cup. Goal-line technology was introduced, a mind-controlled robotic suit allowed a paraplegic fan to deliver the tournament’s opening kick, and headlines have touted the Brazuca, the official match ball, as one of the most aerodynamic soccer balls ever created.

With only six thermally bonded — not stitched — polyurethane panels, the Brazuca represents how far the soccer ball has come since the game’s early days. “Some ancient ball games were played with balls that were animal skins stuffed with hay or sand. There are also stories of games played with the heads of defeated enemies!” These games must have been a bit slow-paced, since some of the most intriguing aspects of the game occur because the ball bounces,” John writes.

**World Cup boosts soccer in US**

“Soccer is a game of tactics and strategy with a rich overlay of history and tradition. It is, without question, the most popular sport in the world. In fact, the quadrennial World Cup tournament is the world’s most-watched event,” John writes. Although professional soccer has yet to experience the sustained popularity of football or basketball in the US, it has already experienced a boost with the national team performing well on the international stage. “If you look at the Ghana game, it was significant,” John says.

This year’s tournament has broken television audience records in the US. When the US and Ghana played on June 16, it was the most-watched soccer match in US history. That record was broken the following week, however, when the US lost to Belgium, ratings showed the broadcast had drawn the second-highest US television audience for a men’s game.
Sandia has transferred management authority for the production of four nuclear weapon product families to the Kansas City Plant. NNSA agreed with Sandia’s suggested move to better align production responsibilities to each site’s core competencies.

Sandia President and Laboratories Director Paul Hommert and Chris Gentile, president of Kansas City Plant contractor Honeywell Federal Manufacturing & Technologies, signed the agreement June 24 at the National Security Campus in Kansas City, launching a one-year transition period. Sandia transferred production authority to Kansas City for four devices and assemblies.

Better alignment with core strengths

“This is a self-started and collaborative initiative we have developed together and fully endorse,” Paul said. “We believe it better aligns core strengths at each site and that it creates added value and efficiencies through the consolidation of resources and the leverage of existing supply chain management systems and infrastructure.”

The shift in workload represents about $100 million over 10 years, running through fiscal year 2024, said Org. 2500 Director Anthony Medina, who is in charge of Sandia’s External Production Program.

During the transition, Sandia will familiarize KCP with requirements for each product — about 50 individual parts in all — and the operation of the testers that collect data to make sure those requirements are met, said Org. 2600 Director David Plummer, whose organization is responsible for three of the four transferred product families and who attended the ceremony along with Paul and Geoffrey Beausoleil, manager of the NNSA Sandia Field Office.

Sandia retains design authority for those components. It will continue managing external production for four other families of products whose production needs better align to Sandia capabilities.

Sandia transfers management for production of four component families to Kansas City Plant

**By Sue Major Holmes**

Sandia’s summer interns gathered recently in Bldg. 858EL for the day-long Intern Technology and Business Expo, which provided a one-stop opportunity for interns to learn about career options at Sandia with select managers and staff representing Sandia’s top hire fields.

Areas of focus during morning sessions included a computer science/computer engineering track and a mechanical engineering track.

After a lunch break, afternoon tracks included an electrical engineering track, a business track, and a materials science and engineering track.

In the photo below, Basil Hassan, manager of Aerospace Systems Analysis Dept. 5422, addresses interns during the morning track on mechanical engineering opportunities at Sandia.

The event was hosted by Recruiting and Student Programs Dept. 3555. For more information about intern programs and activities, go to http://info.sandia.gov/interncentral.

**Internal Technology and Business Expo**

*Photo by Randy Montoya*

**Record number of Sandians considered for prestigious HENAAC awards**

HISPANIC ROLE MODELS — Fourteen Sandians were recommended by their managers for Hispanic Engineer National Achievement Awards (HENAAC), and two of them were selected to be the Lab’s official nominees. The awards program, now in its 26th year, honors the nation’s best and brightest Hispanic engineering, science, and technology experts. Nominees from around the country will be evaluated by Great Minds in STEM, which coordinates the annual HENAAC awards and conference. The call for nominations within Sandia brought a record number of potential nominees. They were recognized at a June 19 event. Among them, in the photo above, were (back row from left) Julie Cordero (4879), Dena Vigil (1441), Lysle Serna (1818), and Marie Arrieta (6813), and (front row from left) Richard Jones (1787), Larry Carillo (8247), Oscar Hernandez (5952), and Edward Jimenez Jr. (9515). Not pictured are Reno Sanchez (5771), Igal Brener (1712), Kristina Rodriguez Czuchlewski (5346), Rudy Garcia (5554), Patrick Serna (2220), and Steven Trujillo (1220). Julie and Edward were chosen to move forward in the awards program. Thirty Sandians have received HENAAC awards in the past 17 years. Anthony Medina, Center 2500 director and a HENAAC winner, said at the event that the internal nominations “identify and lift up role models in the Hispanic community to inspire young people to take up STEM fields in school.”

*(Photo by Randy Montoya)*
MISCELLANEOUS

FABULOUS FELINES SUMMER PARTY, Sunday, July 13, food, music, silent auction, call for more details. Mundt, 505-412-3812, ask for Miranda.

ELLIPTICAL, Sole E55, w/many fea-
tures, excellent condition, $600.
Telhaya, 264-7510.

ABOVE GROUND POOL, Intex, 18’ x
49’, clean, good condition, w/3-pump, filters, many accessories, $200 OBO. Walker, 555-379-9745.

TIMESHARE, Winter Park, CO, July 25-

PRECIOUS MOMENTS Southern Bell
TIMESHARE, Winter Park, CO, July 25-

FOUR-POSTER CANOPY BED, queen,
new, BF Goodrich Mud Terrain, 33x12.5R15, KM2, Lomas NE, in need of gently used tires, $15. Baros, 417-9841.

DOG BAY WATCH, Sea Gull, 15.8K miles,
good in low light & video, w/ac-
ceptable abbreviations.

ABOVE GROUND POOL, Intex, 18’ x
49’, clean, good condition, w/3-pump, filters, many accessories, $200 OBO. Walker, 555-379-9745.

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DIGITAL CAMERA, Nikon CoolPix
TWO-SEATER SWING, Pinehurst, dark
BED TOPPER, king, memory novaform,
ANNUAL GOLF TOURNAMENT,

MISCELLANEOUS

POOL TABLE, Connelley Ventana,
CARGO/LUGGAGE TRAILER, small,
FOUR-POSTER CANOPY BED, queen,
SPARE TIRE, new, BF Goodrich Mud Terrain, 33x12.5R15, KM2, Lomas NE, in need of gently used tires, $15. Baros, 417-9841.

Tiffany doll, 16-in. tall, w/tags, ex-
tremely well-maintained, $60. Urioste, 505-918-4054.

WONDERFUL WEDNESDAY, July 10, 11, 6-9 p.m., fundraiser. Prime time entertainment, good food, NSFL, w/ping pong board & net, balls, $225; Sportcraft pool table chairs, 59” x 41”, 18-in. leaves, $675; 5-1/2’ x 10’ above ground pool, Intex, 18’ x 49’, clean, good condition, w/3-pump, filters, many accessories, $200 OBO. Walker, 555-379-9745.


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TWO-SEATER SWING, Pinehurst, dark
BED TOPPER, king, memory novaform,
ANNUAL GOLF TOURNAMENT,
By Nancy Salem

Joint hire brings Sandia, UNM more R&D collaboration

Sandia and the University of New Mexico have hired Fernando Garzón, a nationally recognized scientist and inventor, to work for both institutions to advance mutual interests in science and engineering. It is the first joint hire recruited together by Sandia and UNM.

"Sandia National Laboratories and the University of New Mexico have enjoyed a close relationship for many years in the areas of research, education, and technology development and deployment," says Div. 7000 VP and Chief Technology Officer Julia Phillips. "The joint-hire program is a natural development in that deepening partnership and one that promises new opportunities for even stronger collaborations between the two institutions."

Garzón has been technical team leader for high-temperature materials chemistry in the Sensors and Electrochemical Devices Group at Los Alamos National Laboratory. He holds a Bachelor of Science in metallurgy and materials science and a doctorate in material science and engineering from the University of Pennsylvania. He joined LANL in 1988.

Garzón will concurrently hold the positions of R&D staff member at Sandia and tenured professor at UNM. He is considered a part-time employee of each institution with work-space provided by both. He will split his time equally, or 20 hours a week at each institution, and each will offer a separate salary and benefit package based on the part-time work.

He will establish and lead a research program in the area of materials science and engineering with an emphasis on energy technologies. According to the joint-hire agreement he will initiate and foster research collaborations among UNM faculty and Sandia R&D staff. He will attract, mentor, and direct junior faculty and Sandia researchers, post-docs, and students to both Sandia and UNM. And he will help form strategic partnerships between Sandia, UNM, and other research institutions.

"I am very excited to work with both UNM and Sandia," Garzón says. "The synergies between the university and the national lab create a unique research environment to mutually develop advanced energy technologies."

Sandia and UNM signed a memorandum of understanding in 2011 that identified areas of research collaboration and contemplated the joint hiring of nationally prominent faculty. Two Sandia researchers, Jeff Brinker (1000) and Rick Kemp (1815), also work for UNM as professors, but were Sandia employees before joining the university. Garzón is the first to start as a joint employee.

Terry Aselage, director of Sandia’s Materials Science and Engineering Center 1800 and a member of the Sandia search team, praised the process for hiring Garzón. "The engagement from UNM leadership was fantastic, and the search committee members from both sides worked hard and well together," Terry says. "I am certain that these interactions will further the Sandia/UNM collaboration, and that the Advanced Materials Laboratory, which supports collaboration among Sandia, UNM, and industry in materials R&D and tech transfer, will continue to serve as a flagship for these collaborations."

Garzón’s research interests include fuel cell materials technology, energy storage, high-temperature materials and devices, development of advanced gas sensors, electronic conducting transition metal oxides, thin film growth, ceramic membrane technology, and solid state ionics. He has co-authored more than 130 scientific publications with more than 4,000 citations. He is an inventor of an R&D 100 award-winning high temperature combustion control sensor. He also developed a new class of solid-state gas sensors for hydrocarbons, carbon monoxide, and nitric oxides.

Garzón, who starts work at Sandia and UNM later this year, holds 10 patents in electrochemical technology. He has been president of the Electrochemical Society and is a Fellow of the organization. "The cooperative arrangement also creates an outstanding education experience for students and post-doctoral fellows," Garzón says. "I will be actively engaged in energy storage and conversion research programs and the development of sensing technology to meet future needs for energy efficiency, environmental monitoring, and national security."

Garzón, a distinguished, nationally known researcher with experience at a national laboratory and in academia, Dr. Garzón is ideal for serving as the liaison who stands in 2011 that identified areas of research collaboration and contemplated the joint hiring of nationally prominent faculty. Two Sandia researchers, Jeff Brinker (1000) and Rick Kemp (1815), also work for UNM as professors, but were Sandia employees before joining the university. Garzón is the first to start as a joint employee.

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Garzón’s research interests include fuel cell materials technology, energy storage, high-temperature materials and devices, development of advanced gas sensors, electronic conducting transition metal oxides, thin film growth, ceramic membrane technology, and solid state ionics. He has co-authored more than 130 scientific publications with more than 4,000 citations. He is an inventor of an R&D 100 award-winning high temperature combustion control sensor. He also developed a new class of solid-state gas sensors for hydrocarbons, carbon monoxide, and nitric oxides.

Garzón, who starts work at Sandia and UNM later this year, holds 10 patents in electrochemical technology. He has been president of the Electrochemical Society and is a Fellow of the organization. "The cooperative arrangement also creates an outstanding education experience for students and post-doctoral fellows," Garzón says. "I will be actively engaged in energy storage and conversion research programs and the development of sensing technology to meet future needs for energy efficiency, environmental monitoring, and national security."

"As a distinguished, nationally known researcher with experience at a national laboratory and in academia, Dr. Garzón is ideal for serving as the liaison who helps pull together and develop staff from both worlds to tackle important research," Julia says. "His role should be to create new programs that both draw on and benefit research staff and the important missions of both Sandia and UNM."