

## Long Island Business News Names BNL's Paul Kalb 'Innovator of the Year'



Roger Stoulenburgh 02-49-1002

Paul Kalb of the Environmental Sciences Department (ESD) was one of seven Long Islanders honored as an "Innovator of the Year" by *Long Island Business News* at its fourth annual awards luncheon, held on October 2. A panel of judges from business and academia chose the seven innovators, each of whom received an engraved sculpture in the shape of a light bulb.

Kalb won the honor for his efforts in developing a patented technology called sulfur polymer stabilization/solidification (SPSS), which makes the disposal of mercury more practical and safer, compared to existing disposal methods. BNL has licensed this technology to Newmont Technologies Limited, an affiliate of Newmont Mining Corporation, the largest gold producer in North America. Mercury is a toxic by-product of gold mining.

"I am pleased to be recognized for the mercury-waste clean-up technology," Kalb said. "This has been a real team effort, and many colleagues have provided significant contributions to the ultimate success of the process. It is especially rewarding to see this technology advance from the laboratory to industry, where it is solving a real problem."

In SPSS, toxic liquid mercury is mixed with sulfur polymer cement and small amounts of additives in a heated

(continued on page 2)

## Role of Cancer Protein Identified By Princeton, LBNL Teams at NSLS



Scientists working at BNL's National Synchrotron Light Source (NSLS) have unveiled the details of an important cancer protein. Though the protein, called Ski — for Sloan Kettering Institute, where it was identified in the early 1980s — is known to trigger tumor growth, how it does this is still not well understood. The new results, which are reported in the November 1 issue of *Cell*, shed light on this process and may provide ways to design new anticancer drugs.

"We now have a very important clue as to how Ski interferes with key proteins that prevent cells from becoming cancerous," says Yigong Shi, a molecular biologist at Princeton University. Shi leads one of the two teams, one from Princeton and one from Lawrence Berkeley National Laboratory (LBNL), that conducted the study, which is supported by the National Institutes of Health and the Searle Scholar and the Rita Allen Foundations.

"Understanding how to stop Ski from disrupting the normal function of cells will probably be key to developing new anticancer drugs," continued Shi.

Ski prevents a protein called transforming growth factor-beta (TGF- $\beta$ ) from safeguarding cells against excessive growth.

"TGF- $\beta$  acts like a molecular traffic light, ordering certain cells to slow down and stop dividing,"

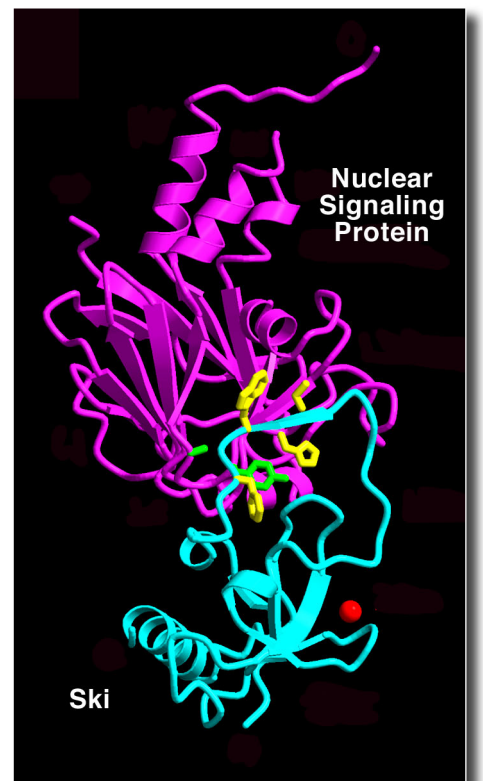
Shi says. "When TGF- $\beta$  is blocked, for example by Ski, cells manage to speed through this checkpoint, triggering runaway cellular growth that eventually results in cancerous tumors."

TGF- $\beta$  cannot enter cells, so it transmits its signal inside the cell by attaching to receptor proteins on the cell's outer surface. The signal generated by this interaction is carried across the cell membrane to proteins inside the cell.

Some of these signaling proteins are triggered inside the cell cytoplasm and later bind to other proteins inside the nucleus. The combination of both types of signaling proteins activates genes necessary for the normal functioning of the cell.

Ski, which is already present in the human body, disrupts the signaling proteins when it is either overexpressed or introduced by a virus inside the body. The new study focused on the first of these two possible processes.

"Scientists have previously shown that Ski disrupts normal cell functioning by directly dis-



Overall structure of the complex of Ski and a nuclear signaling protein.

rupting the expression of genes inside the cell's nucleus," Shi says. "But nobody has ever investigated whether Ski could disrupt the signaling proteins that activate the genes."

The Princeton team looked at the molecular details of a complex made of Ski and nuclear signaling proteins by using x-rays generated at the NSLS.

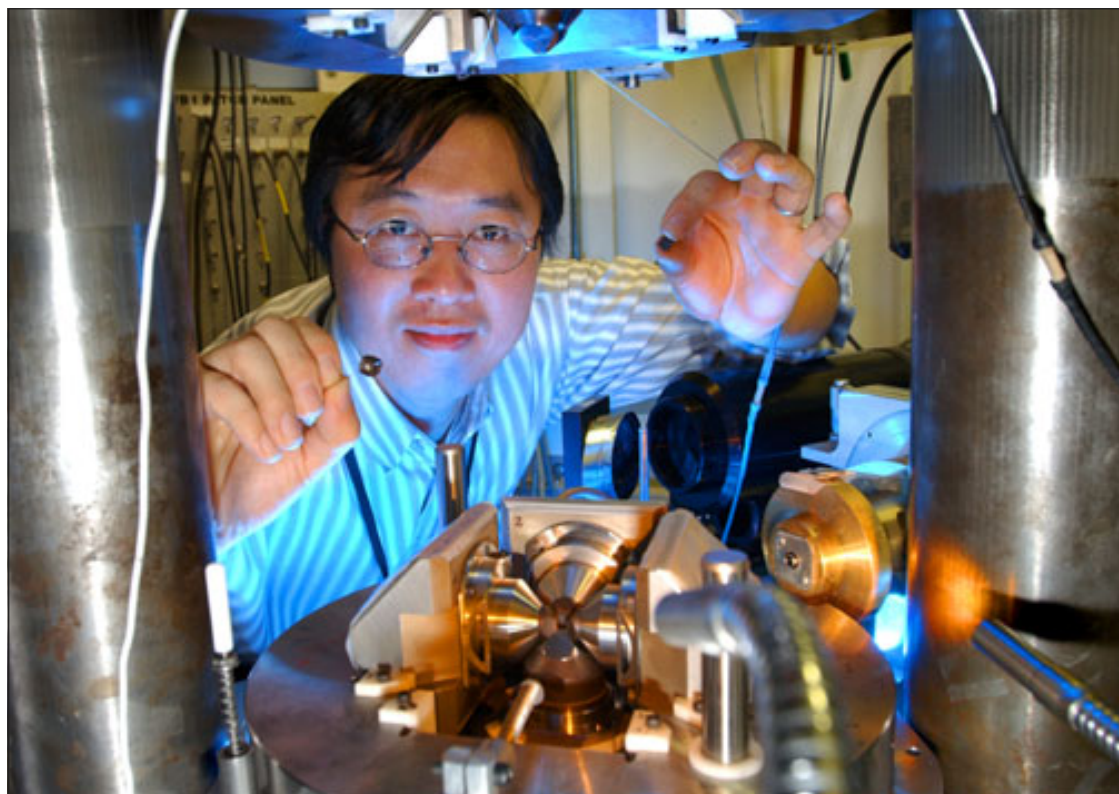
(continued on page 2)

## SBU Researchers at the NSLS Discover Properties of Perovskite, Explain Why No Earthquakes Start in Earth's Lower Mantle

Recent research at the National Synchrotron Light Source (NSLS), reported in the October 24 issue of *Nature* by Stony Brook University (SBU) scientists, illustrates for the first time why earthquakes do not start in the Earth's lower mantle, the lower part of the roughly 1,400-mile-thick portion surrounding Earth's core.

Using bright, hard x-rays from the superconductor wiggler beam line X17 of the NSLS, Jihua Chen of SBU's Mineral Physics Institute led research in measuring the strength of  $Mg_{0.9}Fe_{0.1}SiO_3$  perovskite, a dominant mineral of the lower mantle, at high pressure and temperature. Collaborators in this research, which is funded by the National Science Foundation, are Donald Weidner and Michael Vaughan, both of SBU.

"We found that the perovskite not only is stronger than other minerals at high pressure and temperature, but also has a temperature-insensitive plastic-flow character," said Chen. "The result revises the existing prediction of the rheological property — which is the flow of a material under stress — of Earth's lower mantle and thus supplies the first experimental evidence for understanding why earth-



Jihua Chen is at beam line X17B at the National Synchrotron Light Source, where a Stony Brook University team has developed equipment that can simulate temperature and pressure conditions needed for studying Earth's structure and dynamics.

quakes do not start in the lower mantle.

"This result also sheds light on many other of Earth's dynamics," added Chen.

He explained that, from surface to center, Earth's structure

is made up of the crust; the upper mantle; the transition zone; the lower mantle; the outer core, which is liquid; and the inner core. Earth's crust is divided into areas called tectonic plates which move separately

and rub against each other.

Some earthquakes occur when adjacent plates "catch" and then suddenly release the pressure that has built up over time. These are called near-surface or shallow earthquakes.

When two plates collide, the thinner, denser plate is forced under the thicker, lighter plate and sinks deep into the mantle. This process is called subduction.

Earthquakes can also start along the subducting slab. These earthquakes are called deep earthquakes.

"Our result helps in understanding more about the deflection of the subducting slab at the top of the lower mantle, because the strong perovskite may create a mechanical barrier to the subduction," said Chen. "We can now also predict a viscosity jump at the boundary between the transition zone — the portion of Earth that is between 250 and 410 miles deep — and the lower mantle, which is very important information for modeling convection processes in Earth."

Chen explained that the mechanism of deep earthquakes has been a long-standing question. Geophysicists know that seismic observations show no earthquakes starting in the lower mantle, but until the SBU study of perovskite, the reason was unclear.

"We have studied the rheological properties of many

(continued on page 2)

Roger Stoulenburgh 02-37-002

## Calendar of Laboratory Events

- The BERA Sales Office is located in Berkner Hall and is open weekdays from 9 a.m. to 3 p.m. For more information on BERA events, contact Andrea Dehler, Ext. 3347; or Chris Carter, Ext. 2873.
- Additional information for Hospitality Committee events can be found at the Lollipop House and the laundry in the apartment area.
- The Recreation Building (Rec. Bldg.) is located in the apartment area.
- Contact names are provided for most events for more information.
- Calendar events flagged with an asterisk (\*) have an accompanying story in this week's Bulletin.

### — EACH WEEK —

#### Weekdays: Free English for Speakers of Other Languages Classes

Beginner, Intermediate, and Advanced classes. Various times. All are welcome. Learn English, make friends. See [www.bnl.gov/esol/schedule.html](http://www.bnl.gov/esol/schedule.html) for schedule. Jen Lynch, Ext. 4894.

#### Mondays: BNL Gospel Choir

5:15-7 p.m. Berkner Hall. All faiths are welcome. [www.bnl.gov/bera/activities/choir/](http://www.bnl.gov/bera/activities/choir/).

#### Mon., Tues., & Thurs.: Kickboxing

\$5 per class. Mon. & Thurs. noon-1 p.m. in the gym; Tues., 5:15-6:15 p.m. in the gym; Thurs., 5:15-6:15 p.m. in Brookhaven Ctr. Registration is required. Mary Wood, Ext. 5923, or wood2@bnl.gov.

#### Mon., Thurs., & Fri.: Tai Chi

Noon-12:45 p.m., Brookhaven Center North Room. Adam Rusek, Ext. 5830 or rusek@bnl.gov.

#### Mondays: BNL Dance Club Ballroom, Latin & Swing Practice

5:30-7 p.m. North Ballroom, Brookhaven Center, except Lab holidays. Jean Logan, [jlogan@bnl.gov](mailto:jlogan@bnl.gov) or Ext. 4391.

#### Tuesdays: Welcome Coffee

10-11:30 a.m. Rec. Bldg. Hospitality event. Come and meet friends. The first Tuesday of every month is special for Lab newcomers and leaving guests. Hospitality Chair Monique de la Beij, 399-7656.

#### Tuesdays: BNL Music Club

Noon, North Room, Brookhaven Center. Come hear live music. Joe Vignola, Ext. 3846.

#### Tuesdays: Aqua Aerobics

5:15-6:15 p.m. \$2 pool fee per class or use pool pass. Mary Wood, Ext. 5923.

#### Tuesdays: BNL Dance Club Individual & Couples Instruction

5-11 p.m. North Ballroom, Brookhaven Center. Ron Ondrovic, [ondrovic@bnl.gov](mailto:ondrovic@bnl.gov) or Ext. 4553.

#### Tuesdays: Toastmasters

1st and 3rd Tuesday of each month, 5:30 p.m., Bldg. 463, room 160. Guests, visitors always welcome. [www.bnl.gov/bera/activities/toastmasters/default.htm](http://www.bnl.gov/bera/activities/toastmasters/default.htm).

#### Tuesdays & Thursdays: Aerobics

5:15-6:30 p.m., \$4 per class. Rec. Bldg. Pat Flood, Ext. 7886.

#### Wednesdays: On-Site Play Group

10 a.m.-noon. Rec. Bldg. A infant/toddler drop-in event. Parents meet while children play. Svetlana Agafonova, 205-5065.

#### Wednesdays: Farmer's Market

11:30 a.m.-1:30 p.m., Berkner Hall parking lot

#### Wednesdays: Hispanic Heritage Club

11:30 a.m., Berkner Hall, Room D. All are welcome. Carmen Narvaez, Ext. 3254, or [www.bnl.gov/bera/activities/hispanic](http://www.bnl.gov/bera/activities/hispanic).

#### Wednesdays: Weight Watchers

Noon-1 p.m., Brookhaven Center South Room. Mary Wood, Ext. 5923, wood2@bnl.gov.

#### Wednesdays: Yoga Practice

Noon-1 p.m., Brookhaven Ctr. Free. Ila Campbell, Ext. 2206.

#### Wednesdays: Open Chess Night

5-8 p.m., Rec. Bldg. Christine Carter, Ext. 5090.

#### Wednesdays: Exercise 101

5:15-6 p.m., Rec. Bldg. \$4 per class or \$35 for 10 classes. Stretching, low-impact aerobics, and other exercises. Pat Flood, Ext. 7886.

#### Wednesdays: Dance Club Group Lessons

5-9 p.m. North Ballroom, Brookhaven Center. Marsha Belford, [belford@bnl.gov](mailto:belford@bnl.gov) or Ext. 5053.

#### Thursdays: Science Discussion Group

12:30-1:30 p.m., Berkner Hall, Room A or D. Patrice Pages, Ext. 3270, [pages@bnl.gov](mailto:pages@bnl.gov).

#### Fridays: BNL Social & Cultural Club

8-11:30 p.m., Brookhaven Ctr., social. Rudy Alforque, Ext. 4733, [rudy@bnl.gov](mailto:rudy@bnl.gov).

#### Saturdays: BNL Dance Club Monthly Ballroom Dance Social

8-11:30 p.m. Ballroom, Latin & swing dancing, North Ballroom, Brookhaven Center. 10/5, 11/9, Tuesday 12/31, 1/25, 2/15, 3/15, 4/12, 5/17. Marsha Belford, [belford@bnl.gov](mailto:belford@bnl.gov) or Ext. 5053.

### — NEXT WEEK —

#### Monday, 11/4

#### NNDC Golden Jubilee

2 p.m., Berkner Hall. To mark the National Nuclear Data Center's 50 years of continuous service to the nuclear physics community and applied users, all former and present staff members and colleagues of the Data Center are invited to an afternoon of reminiscences. See announcement, top right, page 2 or go to [www.nndc.bnl.gov](http://www.nndc.bnl.gov).

## In Memoriam: Lyle Borst

Lyle Borst, a nuclear physicist who led the design and construction of BNL's first nuclear reactor, the Brookhaven Graphite Research Reactor (BGRR), died on July 30. He was 89.



Borst began to assist with the

new reactor project for what was to be BNL, in May 1946, even before the Upton site was chosen. He had earned a doctorate at the University of Chicago in 1941. In 1942, he had joined the metallurgical laboratory in Chicago where Enrico Fermi conducted the first self-sustaining nuclear chain reaction. An early member of the Manhattan Project, Borst then became supervisor of research at the second nuclear reactor ever built, the X-10 at Oak Ridge, which came on line in 1943.

Borst left Oak Ridge to head the BGRR design team, which began detailed studies in October 1946. Originally, the BGRR was to have been a bigger copy of the X-10, but Borst and his group made changes to improve safety,

especially in fuel-handling. Another modification, in the air-cooling design, allowed the reactor to run at a higher fission rate, giving a greater flux of neutrons for experimenters. The BGRR started operating on August

22, 1950, as the first reactor to be built solely for research and other peacetime uses of atomic energy, and it accommodated more simultaneous experiments than other existing reactor.

Highlights of BGRR research still important today include, for example, studies that led to the development of multi-grade motor oils, and the radioactive isotope technetium-99m, a clinical diagnostic tool.

In 1950, Borst left BNL to become a professor of physics at the University of Utah. He also taught at New York University and the State University of New York at Buffalo.

Lyle Borst is survived by his wife of 63 years, Ruth; three children, and seven grandchildren.

### Earthquakes (cont'd.)

mantle minerals," Chen said. "Our results indicate that, among many possible mechanisms, plastic instability may be responsible for the earthquakes."

Investigating the properties of perovskite is difficult because this mineral, unlike others, is unstable under ambient conditions.

"However, with the experimental instrumentation that we developed at the NSLS, we could finally challenge the problem," said Chen. "Our goal is to gain a full understanding of Earth's structure and dynamics. With the NSLS right on our doorstep, we are approaching this goal."

— Liz Seubert

### Cancer Protein (cont'd.)

The researchers saw that, as they had suspected, Ski disrupts the cytoplasmic signaling proteins, so that when Ski binds to the nuclear signaling proteins, the cytoplasmic signaling proteins cannot attach to their nuclear counterparts. "This binding process is probably one of the major ways in which Ski disrupts the signaling proteins and, thus, suppresses the action of TGF- $\beta$ ," Shi says.

The LBNL team performed various biochemical tests that confirmed these results by also showing that Ski binds to nuclear signaling proteins.

— Patrice Pages



Schematic diagram of a proposed mechanism for the Ski-mediated repression of TGF- $\beta$  signaling. By simultaneously binding to the cytoplasmic (yellow) and nuclear (purple) signaling proteins, Ski prevents the two signaling proteins from binding to each other, thus suppressing the action of TGF- $\beta$ .

For more information, go to: [www.bnl.gov/bnlweb/pubaf/pr/2002/bnlpr103102.htm](http://www.bnl.gov/bnlweb/pubaf/pr/2002/bnlpr103102.htm).

### Paul Kalb (cont'd.)

vessel until all the mercury is converted into mercuric sulfide, a compound that has low solubility and low vapor pressure. This mixture is then poured into a mold in which it cools and solidifies. The resulting solid waste form immobilizes the mercury. "Conventional amalgamation also stabilizes mercury," Kalb explained, "but it transforms the element into a dispersible powder, which can be easily mobilized by wind and groundwater. SPSS makes mercury easier and safer to handle and to dispose of, and it isolates the toxic metal from the environment."

The SPSS method is based on a patented mixed-waste treatment technology developed at BNL in 1997. Mixed waste consists of metals and/or chemicals as well as radioactive materials. This work, as well as development of the new method for mercury stabilization, was funded by DOE.

Kalb holds a bachelor's degree in mechanical engineering technology from the State University of New York at Binghamton, and a master's degree in nuclear engineering and a certificate in energy policy and engineering from the Polytechnic Institute of New York.

At BNL since 1980, Kalb heads environmental research and technology development in ESD. He is listed as the co-inventor on seven U.S. patents. Kalb has coauthored several books on innovative technology for waste treatment and has written numerous peer-reviewed articles on waste encapsulation.

— Diane Greenberg

### No Bulletin 11/15, 29

BNL will be closed in observance of Veterans' Day on Monday, 11/11, so no Bulletin will appear on Friday, 11/15. Also, because BNL is closed to celebrate Thanksgiving on Thursday and Friday, 11/28 & 29, there will be no Bulletin on Friday, 11/29.

## National Nuclear Data Center Celebrates Golden Jubilee With Seminar, 11/4, 2 p.m.

All are welcome at an afternoon seminar on Monday, November 4, starting at 2 p.m. in Berkner Hall, to celebrate the National Nuclear Data Center (NNDC) Golden Jubilee. The NNDC traces its roots back to the Sigma Center, formed in the BNL Physics Department under the leadership of Donald J. Hughes. The seminar will consist of talks on the history of the center. Among the scheduled speakers are John Harvey and Robert Chrien, members of the original center, and Vicki McLane, a member of the center since 1962. Also scheduled to speak are Mulki Bhat, a former staff member, Peter Kahn of Stony Brook University, and Hans Lemmel, formerly of the International Atomic Energy Agency Nuclear Data Section.

## BSA Shopping Shuttle Available Saturday Mornings and Wednesday Evenings

All BNLeers are encouraged to use the free shuttle that makes multiple trips between BNL and the Southport Shopping Center on Saturday mornings and Wednesday evenings. See schedule below.

The Southport Shopping Center, located at the junction of Montauk Highway and William Floyd Parkway in Shirley, is home to a Waldbaum's supermarket, Blockbuster video store, Coconuts music store, Kohl's department store, The Gap, Kaybee toy store, Astoria Federal Savings Bank, Payless Shoes, Bath and Body Works, The Children's Place, a pizza shop, Hallmark Cards & Gift Shop, Sears Hardware, a bagel shop, a jewelry store, and more.

### Saturday Morning Schedule

The shuttle will make multiple trips between BNL and the Southport Shopping Center from 8:30 a.m. to noon.

The following is the time and place of the first shuttle pickup:

8:30 a.m. ....	Fleming House, Building 180
8:35 a.m. ....	Curie House, Building 258
8:45 a.m. ....	Children's Outdoor Shelter (Lollipop House)
8:50 a.m. ....	Efficiency apartments 41-42

The last shuttle to return to BNL will depart at noon from the Waldbaum's supermarket.

### Wednesday Evening Schedule

The shuttle will make multiple trips between BNL and the Southport Shopping Center from 5 to 8:30 p.m.

The following is the time and place of the first shuttle pickup:

5 p.m. ....	Fleming House, Building 180
5:05 p.m. ....	Curie House, Building 258
5:15 p.m. ....	Children's Outdoor Shelter (Lollipop House)
5:20 p.m. ....	Efficiency apartments 41-42

The last shuttle to return to BNL will depart at 8:30 p.m. from Waldbaum's supermarket.

## BERA Sponsors Book Fair, 11/5, 6

### A chance to start fun holiday shopping

BERA is sponsoring a Book Fair on Tuesday and Wednesday, November 5 & 6, 10 a.m.-3p.m. Books will range from children's stories to cookbooks to *The New York Times* best-sellers. New, hard-cover books will be in stock and sold at up to a 70 percent reduction. Gift items will also be available. Credit cards and checks will be accepted. For more information contact Andrea Dehler, x3347.

## Research Library Closed on Saturdays

The Research Library will be closed on Saturdays, effective the week of November 4. Library weekday hours will remain the same: 8:30 a.m.-7 p.m., Monday through Friday. Researchers may arrange for access to the Library at other times by contacting Michiko Tanaka, Ext. 7761.

This difficult decision, driven by budgetary requirements, has been made in consultation with the Library Research Advisory Committee and BNL Interim Director Peter Paul. It takes into consideration the much greater number of library users who visit during early evening hours on weekdays than the number who visit on Saturdays. Individuals who need access to the library on the weekend may obtain a key from library staff. The Research Library is moving more and more to electronic journals, which provide remote access at all times. Also, investment has been made for the Web of Science, and additional investments in e-journals will be made early in fiscal year 2003.

## BERA Holiday Party, 12/6

BERA will hold its Annual Holiday Party on Friday, December 6, at the East Wind Caterers in Wading River from 6 to 10 p.m. All the Lab community — employees, guests, facility users, retirees, and their families — are invited to celebrate this holiday event together.

The cost is \$48 if tickets are purchased before November 15, and \$60 if purchased between November 18 and November 29. Ticket price includes full open bar, cocktail reception, hors d'oeuvres, salad, two pasta specialties, four hot entrees, cake, coffee, and DJ music. Purchase tickets by Friday, November 29, at the BERA Sales Office in Berkner Hall.



