

## CRADAs—the Wave of the Future

PPPL is a treasure trove of world-class science and technology, much of which has unexplored potential for commercialization. The Department of Energy is encouraging the exploration of commercial opportunities through Cooperative Research and Development Agreements (CRADAs)—with the ultimate goal of increasing the economic competitiveness of the United States.

According to Lab Director Ron Davidson, “CRADAs with PPPL are attractive because they allow companies to gain access to our science and engineering expertise and facilities and to leverage resources by pooling staff, facilities, and other resources with those of PPPL. The results can be powerful.”

Two CRADAs are now getting underway at PPPL that will explore important possibilities for industrial applications of fusion-related technologies. The first—to explore the potential for synthesizing chemicals in a plasma—will pair PPPL with a major chemical company.

Says PPPL’s Head of Technology Transfer Lew Meixler, “If the chemical can be produced at the required purity and yield, the chemical company may be interested in working with PPPL to develop small plasma devices for commercial use and licensing such reactor designs from the Lab.”

The second CRADA will develop a sapphire-to-metal bonding technique that produces a firm seal for the caps on high intensity lamps

manufactured by Saphikon. Should the technique be successfully developed, the company would license the process from PPPL to manufacture and sell the lamps, according to Timothy Davis, the president of Saphikon.

Saphikon, which develops high performance products based on sapphire, is a small business located in New Hampshire. Since 80 percent of new jobs in the U.S. are created by small business, the DOE places a high priority on reaching out to this sector.

Over five hundred CRADAs have been made through the DOE since April 1991, reflecting their commercial attractiveness. Said Secretary of Energy Hazel O’Leary “By all indicators, industry interest in partnering with the Department of Energy Laboratories is at an all-time high. There are several reasons why the private sector is showing such strong interest. Foremost is that the laboratories have world-class scientific and technical resources in areas that are deemed valuable for helping individual companies—and industrial consortia—meet their commercial objectives.”

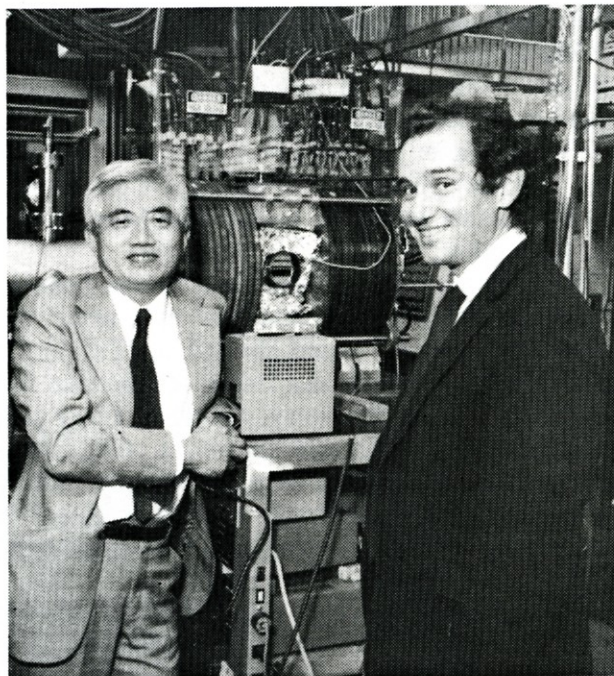


Photo: Dietmar Krause

**Principal Investigators Shoichi Yoshikawa and Philip Efthimion with a plasma device similar to the one that will be built at PPPL for the chemical synthesis CRADA.**

### Using Plasmas to Synthesize Chemicals

Physicist Shoichi Yoshikawa, who spearheaded the idea of developing plasma chemical processing at PPPL, and Physicist Phil Efthimion will direct the chemical synthesis CRADA research here. Technician Jim Gorman will build and operate the plasma source, and graduate students will assist in collecting the data.

Explained Efthimion, “During these proof-of-principle experiments, we will be using a moderate pressure (1-10 Torr) microwave discharge to synthesize the desired chemical. The energetic electrons in the plasma will effectively dissociate the feedstock chemical.

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# Director's Advisory Committee on Women Hosts Breakfast

More than 90 guests got up early on September 23 for a 7:30am buffet breakfast celebrating the activities of the Director's Advisory Committee on Women (DACW). Director Ron Davidson welcomed the women and some members of the Laboratory Council to the LOB Commons, saying "I'm delighted we could have this breakfast meeting and this opportunity to network with one another and to raise questions and concerns."

In his greeting, Davidson observed, "We want to develop a culture of affirmative action at the Laboratory. I'm very pleased with how the Committee has functioned this past year under Jane Murphy's very able leadership."

"Several areas of concern and action have been brought to our attention this year as a result of the Committee's work," noted Davidson. "Training sessions on sexual harassment issues are planned for all employees at the Laboratory. A review every year of the salaries of women and minorities compared with other salaries at the Laboratory was already underway, but was further encouraged by the Committee. Where appropriate, special adjustments will be made to bring salaries into line."

According to Davidson, the DACW has raised the issue of more visible participation by women in committees of the Laboratory, the University, and the Department of Energy (DOE). The Committee also encouraged a clearer expression of flex time policies throughout the Laboratory.

Said Murphy, "The breakfast was a great success, and I'm delighted that so many people made it their priority to be there. We chose an informal breakfast format so that the women at the Laboratory could meet

Committee members face to face, hear about the issues we have looked into since we began meeting last November, and talk directly with us about issues, much as we talk about them during our meetings."

"Through this approach, we were able to hear from women in a wide variety of positions at PPPL about their concerns. We are continuing to get input through written responses from a simple form that was attached to the handout we distributed," added Murphy.

She encouraged people to express their concerns to the Committee on that form or by simply writing ideas down on a piece of paper and sending them to a Committee member. Said Murphy, "We will be discussing all the ideas we've collected at our next meeting and will then distribute a summary of concerns."

The handout also includes the Committee Charter and information on educational assistance, flex time, sexual harassment, secretarial seminars, and organizations related to women's concerns.

To offer an idea or suggestion, ask questions, or receive a copy of the handout, please contact Jane Murphy or another committee member. DACW members are: Sara Flohr, Judy Giarrusso, George Labik, Cynthia Phillips, Faith Robak, Jeanne Salerno, Joanne Savino, Phyllis Schwarz, Lori-Ann Woodard, and Lynne Yager. ❖



Photo: Dietmar Krause

**Sarah Stines of the DOE Princeton Area Office (left), Lynne Yager and Jeanne Salerno of the DACW, and Kathi De Vito exchange ideas at the breakfast.**



Photo: Dietmar Krause

**Jane Murphy, Chair of the Director's Advisory Committee on Women and PPPL Director Ron Davidson were present to welcome guests to the breakfast.**



Photo: Dietmar Krause

**DACW member Phyllis Schwarz (left front) listens to input from Linda Stone (right front) as Joyce Lawton and Irene Orlowski, (backs to camera) chat with Sue Hill.**

## CRADAs

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The major challenge will be to maintain the appropriate conditions for the dissociated products to recombine into the chemical of interest."

Through plasma spectroscopy, the dissociated species will be monitored. The chemical produced will be analyzed to determine which chemical reaction paths are in play, how efficient the process is, and how to optimize the quality and yield.

### Sapphire Bonding

For several years, PPPL has been using a titanium hydride method for bonding ceramics to metal that was developed at the Lab. This technology is of great importance in conditions that must withstand extreme thermomechanical loads—such as in tokamak waveguide windows through which microwaves are injected into the plasma. The Lab now provides small and large customized ceramic brazing for the international high energy physics community.

According to Davis, Saphikon Inc. is interested in PPPL's ceramic brazing process for use in manufacturing a seal (bond) between the metal caps and the sapphire envelope of high performance lamps—which look similar to a typical florescent bulb.

Mechanical Engineer Bob Walls of PPPL who will coordinate the project here says, "I believe there is a high probability that a successful sapphire-to-metal bond can be developed using the Lab's approach."

Chief Engineer John Locher will coordinate the project for Saphikon, Inc. In addition to providing the sapphire material, the company will provide expertise in design and testing of high intensity lamps, as well as in commercial manufacturing.



**President Tim Davis and Chief Engineer John Locher of Saphikon, Inc. examine prototypes of two very high intensity lamps (the pencil-like objects) made from sapphire.**



Photo: Dietmar Krause

**Bob Walls, Project Coordinator for the sapphire-to-metal bonding project, discusses details of the CRADA with Lew Meixler, Head of the PPPL Office of Technology Transfer.**

Says Locher, "The challenge is to develop a seal between the metal and the sapphire that can withstand intense conditions—high temperatures, thermal shock, and operation under vacuum."

Similar lamps now in use have quartz envelopes which devitrify (develop tiny cracks) under high test conditions. According to Locher, "Because the sapphire envelopes would have higher strength and superior resistance to heat, such lamps would have longer lifetimes. In addition, their light is less yellow—an advantage in automated assembly of electronics where whiter light allows more accurate robotic recognition of circuit boards by TV cameras."

A third important quality of the sapphire envelope lamp envisioned by Saphikon is that it would be closer to a point source and therefore provide less blurring at the edges, an advantage in lithography and high definition photography.

### More CRADAs to Come

Lew Meixler, Head of the Office of Technology Transfer expects several more CRADAs to be arranged with PPPL in the coming months. Says Meixler, "We're very excited about CRADAs for PPPL because there are so many potential benefits. In addition to the increased research and development that may come out of the original study, there is also the possibility that any inventions or other intellectual property that results may be licensed—a plus for the inventors, the University, and the Laboratory."❖

**For further information about CRADAs and other technology transfer initiatives, contact:**

**Lewis Meixler, Head  
PPPL Office of Technology Transfer  
LOB B-370 Telephone: 243-3009**



# What's Happening at PPPL?

Photo: Dietmar Krause



*To resolve issues related to a DOE moratorium on the shipment of hazardous waste that could have been exposed to radiation, Environmental Restoration and Waste Management (ER/WM) personnel from PPPL and other DOE labs put their heads together during a June meeting at the local Novotel. The laboratories are now finalizing hazardous waste management policies and procedures for DOE submission, according to Jim Scott of ER/WM at PPPL.*

Photo: Dietmar Krause



*The two new floors added to the East Wing Annex (EWA) of the LOB is one reason that "musical offices" has been the name of the game at the Lab this summer. In left photo Tom Holloway (front) gives Lane Roquemore a hand in moving a file cabinet to his new area.*



Photo: Dietmar Krause

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**Steve Kemp, right, is handed his Earth ball by Angelo Candelori. Earth balls were part of the decorations during the June Open House at the Lab. The winners were chosen through random computer numbers generated by Robert Wilson.**



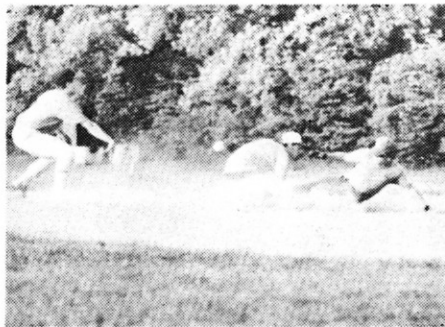
Photo: Dietmar Krause

**Proud owners of "Planet Earth" display their prizes. Left to right, Catherine Iervolino, Kris Gilton, Deborah Smith, Shazim Hosein (kneeling). Angelo Candelori is at right.**

Photo: Dietmar Krause



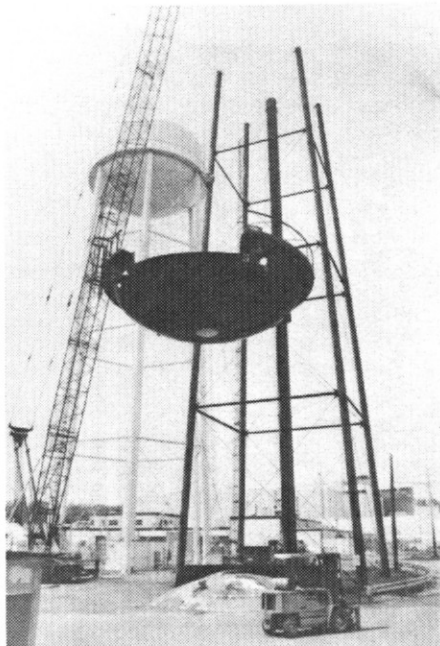
**Kevin Sikorski, Grand Prize Winner and PPPL Corporate Award Winner from Mercer Science and Engineering Fair this spring, discusses his project, "The 3-D Mandelbrot Set - Can It Be Generated," with George Martin in the LOB lobby where he displayed the project on August 12. Sikorski, who also won six other prizes, was at the International Science and Engineering Fair in Mississippi when other PPPL Corporate Award winners were guests at the Lab in May.**



**Hot action on the PPPL baseball fields took the Lab's B team into the finals of this summer's playoffs. Congratulations PPPL!**

Photos: Dietmar Krause





*When wells were in use at PPPL, this water tower was needed, but now the Lab gets water from the city. This summer, with the help of a huge crane, the tower was dismantled in large pieces, and according to Alex DeSantis, FED Project Engineer on the job, was later cut into small chunks for scrap by the subcontractor.*

## Classified

### For Sale

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## HOTLINE

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