BROOKHAVEN NATIONAL LABORATORY

Laboratory Link

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Building 130, P.O. Box 5000
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Phone: 631 344-5658 Fax: 631 344-3654
www.bnl.gov

Evidence That Life on Earth May Have Come From Comets

- Scientists have provided new evidence for the existence of iron sulfide – iron combined with sulfur – in comets, which are large chunks of ice and rock that have remained nearly unchanged since the beginning of the solar system.

- The catalytic behavior of iron sulfides is involved in the formation of hydrocarbons, key building blocks of life. So this discovery reinforces the idea that seeds of life may have come to Earth from comets.

- Sulfur is one of the more abundant elements in space, yet astronomers have never been able to account for it around young stars – until now.

The inner solar system is suffused with a vast cloud of interplanetary dust. This dust cloud is visible with the naked eye as the zodiacal light. The picture above shows the zodiacal light together with comet Hale-Bopp. (courtesy of Richard Wainscoat)

- When the solar system formed, the dust that was not swept up in the solar system ended up in comets. This dust has been sitting inside the icy comets for 4.5 billion years. So comets represent a sort of freezer of pre-solar system materials. By looking at the particles given off by comets, particles can be tracked down that were present in the beginning of the solar system.

Watching Biological Cells Fuse Together

- For the first time, scientists from Brookhaven Laboratory and Rice University have observed the molecular details of biological cells fusing together, a fleeting event never before observed at this scale.

- This research, which could lead to more efficient drug delivery processes and gene therapy techniques, was performed at the National Synchrotron Light Source.

(over)

New Insight into Effects of Alzheimer's Drug

- At the National Synchrotron Light Source at the Laboratory (NSLS), a team of scientists has gained new insight into the effects of a newly approved drug, called rivastigmine, in the treatment of Alzheimer's disease – a debilitating brain disease causing memory loss and other cognitive deficits in about 10 percent of the elderly.
- Though the drug is currently available under the trade name Exelon, its mechanism of action at the atomic level had not been studied until now. So, a team of scientists decided to take a close look at how the drug helps to slow the memory loss of Alzheimer's patients.
- The scientists used x-rays generated by the NSLS to examine how rivastigmine interacts with an enzyme important in the disease process. The results show that Alzheimer's disease could be safely treated with much lower quantities of rivastigmine, thus minimizing unwanted adverse effects.
- The perspectives offered by the results of the research are exciting to the scientists. Fine-tuning the properties of anti-Alzheimer's drugs or their targets at the molecular level offers real hope to find a cure for Alzheimer's disease in the future.

R&D 100 Award for a Smart, High-Performance Coating

- The U.S. Department of Energy's Brookhaven National Laboratory and National Renewable Energy Laboratory, along with industrial partners Bob Curran & Sons and Ticona Corporation, have won a 2002 R&D 100 Award for developing a smart, high-performance coating.
- The coating system is particularly suited for use in carbon-steel heat exchanger tubes in geothermal power plants.
- Toshifumi Sugama, the Laboratory chemist who developed the coating and winner of four R&D 100 Awards, said, "In developing this new system, my colleagues and I have taken a giant leap forward in the technology of coating steel surfaces for use in hostile, corrosive environments. We estimate that the PPS coating system will have a useful life of 20 years in geothermal environments before service is needed. Other coating systems that we tested needed service after six months or less."
- R&D 100 Awards are given annually by R&D Magazine to the top 100 technological achievements of the year. Typically, these are innovations that transform basic science into useful products. The awards were presented in Chicago on October 16.

BNL Chemist Toshifumi Sugama holds up a condenser that has been treated with the polyphenylenesulfide (PPS) coating system and a piece of a partially rusted heat exchanger tube that was not treated.

Events Open to the Public

Mayron K. Tsong, Wednesday, November 6, Noon, Berkner Hall: Prize-winning Canadian pianist Dr. Mayron K. Tsong will perform highlights from programs taken on recent tours of China and Sweden. Free.