

The Materials Science Community and the National Synchrotron Light Source

"Our understanding of materials properties and phenomena can only be as sophisticated as the techniques we can use to probe them." This is one of the most used and abused sentences in modern scientific vernacular. Directors of research or funding programs wince when they hear it because they know what comes next.

But it's true! Frontier materials science research is concerned with increasingly elegant and subtle effects, and if one day this materials science is to become materials technology we must have the tools to match the problem.

There has been a virtual revolution in the capabilities of modern analytical techniques. But many of these modern analytical techniques are becoming prohibitively expensive and require considerable expertise and resources to operate and maintain. Furthermore, the nature of modern materials problems dictates that one must have access to multiple techniques in order to fully span the parameter space necessary for new insight. Thus the individual scientist more and more often seeks out the latest capability which is complementary to his own and collaborates in interdisciplinary and interinstitutional ways in order to make progress.

The role of our national materials research facilities is to provide for the general community capabilities which no single researcher or group of researchers could afford to acquire or maintain, but which are indispensable to the science. This mode of operation has long been the norm in high energy physics, astronomy, space exploration,

and plasma physics—and it has led to great gains.

The potential of synchrotron radiation as the basis for sophisticated analytical techniques to study the properties and phenomena connected with today's advanced materials has been understood for almost two decades. During this period, scientists from many disciplines—ranging from solid-state physics through metallurgy, life science, and geoscience—have been drawn to the area and have developed experimental techniques and methodologies which have opened new vistas in their science and lent a new vitality to the entire field of materials science.

Early successes led to planning in the mid 70s for an extensive expansion in capability and capacity to make synchrotron radiation available to a larger community and to provide instrumentation and sufficient beamtime so that new classes of experiments and a wider community could be accommodated. The National Synchrotron Light Source (NSLS) at Brookhaven National Laboratory, which came out of this initiative, was built by the U.S. Department of Energy to provide synchrotron radiation to the widest possible community in support of its mission of providing for a strong materials science effort for energy, defense, and economic vitality—not only within its own programmatic interests, but across the full range of national interests and funding agencies.

At the NSLS, the long materials sciences tradition of distributing the intellectual and resource base among diverse small

research groups has been preserved by utilizing the concept of "participating research teams." Consortia of researchers from industry, academia, and government laboratories have pooled their resources and research goals to put together beamlines and experimental stations tailored to their needs. They receive 75% of the beamtime for their own experimental programs and provide 25% of the time to the NSLS to distribute to the "general user" who applies for beamtime on a proposal basis. Both groups receive their experimental time at no charge unless they perform proprietary research. The materials scientist can become involved at any level—from the development of new capability with significant emphasis on its use to the occasional measurement to complement other work.

Within the past year, the plans of the last decade have come to fruition and the capacity for synchrotron radiation research has increased by an order of magnitude in the United States. The NSLS is joined by an expanded Stanford Synchrotron Radiation Laboratory, the new 1 GeV ring at the Synchrotron Radiation Center at the University of Wisconsin, CHESS at Cornell University, and SURF at the National Bureau of Standards. It is important that the materials science community realize that the capability is here, that it is for their use, and that it is available for the asking.

M.L. KNOTEK, Chairman
National Synchrotron Light Source
Brookhaven National Laboratory

Do You Have An Opinion?

*The MRS BULLETIN wants your comments
and views on issues affecting materials research.*

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Editor

MRS BULLETIN

9800 McKnight Road, Suite 327

Pittsburgh, PA 15237

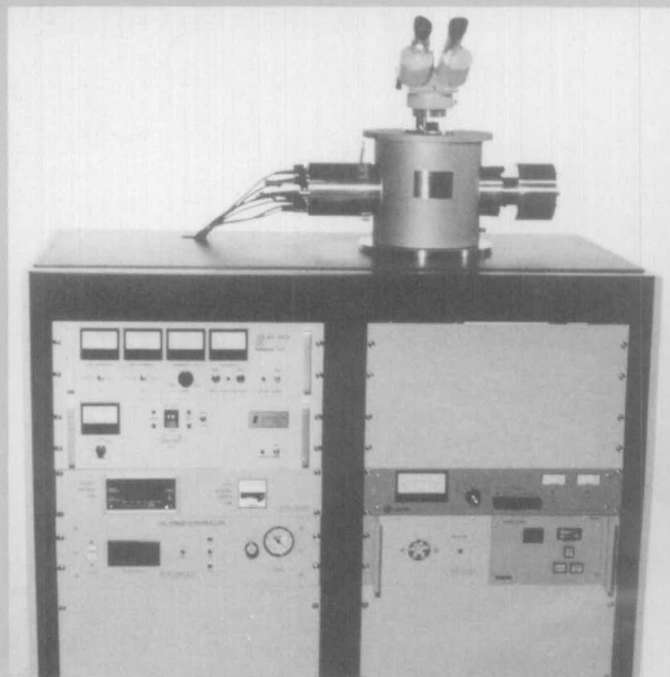
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VCR Group, Inc.

650 Fifth St., Suite 305
San Francisco, CA 94107
Telephone 415 777-5900
Telex 854324