INSTRUMENTATION FOR MATERIALS RESEARCH

Program Announcement and Guidelines

PROPOSAL DEADLINE: *January 29, 1999*

NATIONAL SCIENCE FOUNDATION

BACKGROUND, GOALS, AND SCOPE OF PROGRAM

Observation and discovery of new phenomena are at the very heart of our scientific enterprise. The Instrumentation for Materials Research (IMR) program in the Division of Materials Research (DMR) is designed to provide advanced capability for discovery, observation, characterization, fabrication and testing to the nation's scientists and engineers who are endeavoring to conduct research and educational activities in all areas normally supported by DMR. The Division supports a wide range of programs addressing fundamental phenomena in materials, materials synthesis and processing, structure and composition, properties and performance, and materials education. DMR plays a significant role in various NSF-wide interdisciplinary initiatives and programs. Consult the NSF "Guide to Programs," NSF 99-4 (October 1998) for more information.

The IMR program considers proposals for (1) the ***development*** of major new instruments which (a) demonstrate the potential to significantly extend current capability and (b) have broad application in materials research and education; and (2) the ***acquisition*** of major new research instruments which will provide new capability and/or advance current capability.

The IMR program normally considers proposals for single instruments or a single system. If more than one instrument is requested, the proposal *must* indicate their relative priority, and give explanations and scientific justification for each item requested. A proposal listing assorted instruments without a focused research program will not be reviewed.

Proposers requesting instruments for multidisciplinary use involving more than one Program or Division within NSF are encouraged to discuss their plans with the appropriate Program Officers prior to submission (see section on"Other NSF Programs for Research or Educational Instrumentation"). Multidisciplinary instrumentation proposals must only be submitted to one NSF Division, with a cover letter describing the multidisciplinary nature of the proposal. Proposals which are multidisciplinary in nature will be co-reviewed by the appropriate Division(s) within NSF. Proposals submitted to IMR for instrumentation that are under active review elsewhere in the Foundation are considered inappropriate and will not be reviewed.

The IMR program accepts proposals submitted in accordance with the general guidelines described in "Grant Proposal Guide," (GPG) NSF 99-2 (October 1998), (a) from individuals seeking to purchase or develop instruments which have a total cost of more than $100,000, or (b) from interdisciplinary groups seeking support for major shared instruments to be purchased or developed. Proposals from individuals or groups seeking instruments costing less than $50,000 will be assigned to the appropriate disciplinary program for review. Because of the high cost and complexity of major instruments, proposals for shared instruments are strongly encouraged.

Funding for the IMR program is subject to change annually. It is expected that the support for IMR awards in FY99 will be at the same level as in FY98, pending the availability of funds. The program awarded $6.9 million for support of instrumentation in FY98. Approximate annual award sizes have ranged from $50,000 to $300,000 over the past several years. In past years, approximately 30 new awards were made annually. Typical award durations are one or two years for instrument acquisition, and up to five years for instrument development.

Discussion of your proposal with the IMR Program Director prior to submission is encouraged.

PROPOSAL FORMAT AND ELECTRONIC SUBMISSION

Proposals must be prepared following requirements described in Chapter II of the GPG, NSF 99-2 . The GPG, as well as many other NSF publications, can be obtained from the NSF World Wide Web home page at the following Universal Resource Locator (URL): http://www.nsf.gov. Paper copies of the GPG can be obtained at no cost from:

NSF Publication Clearinghouse
P.O. Box 218
Jessup, MD 20794-0218
Phone: 301-947-2722
Email: pubs@nsf.gov

Proposals must be submitted electronically using the NSF FastLane system for electronic proposal submission and review, available through the World Wide Web at the FastLane Web site (http://www.fastlane.nsf.gov), and must reference this document (NSF 99-24). In order to use NSF FastLane to submit a proposal, you must have the following software: Netscape Navigator 3.0 or above, or Microsoft Internet Explorer 4.0 or above; Adobe Acrobat Reader 3.0 or above; and a PDF File Converter. To access the FastLane Proposal Preparation application, your

institution needs to be a registered FastLane institution. A list of registered institutions and the FastLane registration form are located on the FastLane Web site. Information regarding the FastLane system and instructions for electronic submission are available through the World Wide Web at the FastLane home page (http://www.fastlane.nsf.gov). Additional questions concerning FastLane should be sent via e-mail to Mathematical and Physical Sciences (MPS) FastLane at mpsfl@nsf.gov.

When to submit: The deadline for FastLane submission of IMR proposals **in fiscal year 1999 is 5:00 PM (submitter's local time) January 29, 1999.** Proposals received later will not be reviewed. The signed (paper) cover sheet (NSF Form 1207) must be forwarded to the following address and received by NSF within five working days following proposal submission.

National Science Foundation
DIS-FastLane Cover Sheet
4201 Wilson Blvd.
Arlington, VA 22230

What to submit: IMR proposals must adhere to the NSF GPG 99-2 guidelines for proposal preparation and submission. Instrumentation and equipment proposals should follow the format of research proposals. Each potential major user should describe the project(s) for which the equipment will be used. These descriptions should be succinct, not necessarily as detailed as in an individual research proposal, and should emphasize the intrinsic merit of the activity and the importance of the equipment to it. A brief summary will suffice for auxiliary users. The Project Summary must include a brief description of the proposed instrument and the new scientific and educational capability it will provide, a statement of the potential impact it will have on the research and education/training of students, and the potential impact it is expected to have on one or more fields of scientific research, education, or infrastracture.

You may suggest the names and affiliations of six to eight individuals, including women and members of underrepresented groups, who have expertise in the proposed activities and requested instrumentation, who are not collaborators, and who could provide an unbiased evaluation if requested to review your proposal. The names of individuals who should *not* be used as reviewers may also be included. This information must be sent via the FastLane System using the "List of Suggested Reviewers" selection within the Proposal Preparation function.

Special attention should be given to the following *required supplemental* information which is essential for the review and decision making process. Proposals which do not include this information will not be reviewed.

1. ***Title***. The IMR proposal title should be brief and may not include abbreviations. It should begin with "Acquisition of ---" or "Development of ---." For example: "Development of a Scanning Tunneling Microscope for Materials Research at Low Temperatures." The title must not refer to any specific supplier or include model numbers, and not exceed 15 words.

2. ***Project Description***. The Project Description must clearly justify the instrument requested in terms of the scientific research and educational activities that are being proposed. The new measurement capability that the new instrument will provide should be clearly described. Refer to the GPG guidelines for more guidance. The following items are required *as part of the Project Description* (limited to 15 pages):

A. Instrument Development/Construction Projects:

If **development/construction** of a new instrument is proposed, the design must provide sufficient detail for reviewers to assess its feasibility. Reviewers will be asked to comment on the potential impact that the proposed instrument will have on research and the education/training of students. A brief statement of the anticipated impact of the proposed project is required. The following must be provided:

i. An analysis of the need and broad applicability of the proposed instrument, including potential uses and users in the field of materials research and education;
ii. A description of specific initial research plans for the instrument, and plans for long-range future usage;
iii. Plans for the construction of the instrument;
iv. A description of preliminary work completed;
v. An analysis of potential problems/issues, and proposed solutions;
vi. An estimated timeline for completion within the requested duration of support;
vii. A plan to evaluate the performance of the instrument; and
viii. A description of industrial or national laboratory collaborations or links during the development stages and subsequent to

development/construction completion, if appropriate;

B. Instrument Acquisition Projects:

If purchase of a **new** instrument is proposed, the specific model chosen must be technically justified and a comparison of its expected performance with competing available instruments must be provided. If replacement of an instrument is requested, the scientific rationale for replacement must be given. The following information must be provided for evaluation:

- A technical description of the proposed instrument in sufficient detail for reviewers to evaluate the essential need and appropriateness of the instrument for the research and educational activities proposed; and a paragraph indicating whether the the instrument will be used for new research project(s) or existing research project(s).

- A discussion of the research project(s) for which the instrument will be used in sufficient detail for reviewers to evaluate its scientific merit. For shared instruments, no more than four or five *major* research projects, (projects utilizing 20% or more of the instrument time) may be described in succinct form, emphasizing the intrinsic scientific and educational merit of the activities and the importance of the equipment to them. A brief summary of all additional projects, i.e., those involving less than 20% of the instrument time, is sufficient.
- If the instrument is to be used for existing research projects, a discussion of the new capability the proposed instrument will provide, and how the new instrument will significantly impact the project. If comparable equipment to that requested is already at the proposing organizations, an explanation why it cannot be used must be provided. This includes comparable government-owned equipment that is on-site.

- A discussion of plans for supporting the research and educational activities.

3. The following items must be included following the Project Description as indicated by GPG:

A. ***Biographical sketches***. Required for all senior personnel involved (maximum of five) with the project, major users, and technical personnel responsible for instrument development and/or major instrument operation and maintenance.

B. ***Budget page and budget justification***. As required by Proposal Section F of the GPG, the budget sheet (NSF Form 1030) must include the *total cost* of the proposed project or instrument, the itemized cost of each instrument component, and the proposed level of cost-sharing from *all* non-Federal sources. A full budget justification is required, according to the guidelines in the GPG**. The IMR program requires cost sharing.** Reviewers will be asked to comment on the appropriateness of the level of matching, **since this is a factor in making funding decisions.** The amount of cost sharing must be entered on line M of the NSF Budget Form 1030. The institutional contribution may be negotiated if the proposal receives strong endorsement for support. Competitive proposals have averaged between 40%-50% cost-sharing in the program for several years. Manufacturers discounts, existing equipment, and other sources of Federal funds are not eligible as cost-sharing. The costs of space renovation, installation, shipping charges, state and local taxes, maintenance contracts, technical personnel, and operation of commercial instruments are not ordinarily supported. Assumption of these costs and/or part of the capital costs by the submitting institution may be considered as an indication of its commitment to the proposed project

Personnel, materials, supplies and shop costs may be requested for instrument development and construction projects and will be considered for support if appropriate for the project and documented in the proposal. Requests for personnel support must be justified: the proposal must include a description of the responsibilities of all personnel on the budget, and a clearly articulated rationale for the funds requested. The budget justification must include a timeline if salaries are requested for more than one year.

C. ***Maintenance, Operation, and Use Plans***. A description of the operational plans for the maintenance, operation, and shared use of the instrument is required, including: (i) biographical sketch of the person(s) who will have overall responsibility for maintenance and operation, and a brief statement of qualifications; (ii) description of the physical facility, including floor plans and other appropriate information, where the equipment will be located; (iii) annual budget for operation and maintenance of the proposed equipment, specifying source(s) of funds; (iv) plans for the allocation of time on the instrument and the criteria used for allocation; (v) an estimate of the fraction of time the instrument will be used by the various local and other potential users must be indicated; and (vi) a detailed plan of how use charges will be assessed (if applicable).

PROPOSAL REVIEW PROCESS

Proposals will be evaluated on the basis of merit review by experts in the research and educational community by appropriate mechanisms, which may include ad *hoc* mail review, panel review, or a combination of mail and panel review. In addition to the NSF merit review criteria, other factors will be considered, including the potential scientific and educational impact, the appropriateness of the instrumentation, and the potential impact on the academic infrastructure.

NSF merit review criteria:

What is the intellectual merit and quality of the proposed activity?

The following are suggested questions that the reviewers will be requested to consider in assessing how well the proposal meets this criterion. Each reviewer will address only those questions that are relevant to the proposal and for which the reviewer is qualified to make judgments.

How important is the proposed activity to advancing knowledge and understanding within its own field and across different fields? How well qualified is the proposer (individuals or team) to conduct the project? If appropriate, the reviewer will comment on the quality of prior work. To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?

The following are suggested questions that the reviewers will be requested to consider in assessing how well the proposal meets this criterion. Each reviewer will address only those questions that are relevant to the proposal and for which the reviewer is qualified to make judgments.

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

Integration of Research and Education

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learner perspectives. PIs should address this issue in their proposal to provide reviewers with the information necessary to respond fully to both NSF merit review criteria as well as additional criteria specific to the IMR Program. NSF staff will give it careful consideration in making funding decisions.

Integrating Diversity into NSF Programs, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens – women and men, underrepresented minorities, and persons with disabilities – is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activites it considers and supports. Principal Investigators should address this issue in their proposal to provide reviewers with the information necessary to

respond fully to both NSF merit review criteria. NSF staff will give it careful consideration in making funding decisions.

Additional Criteria Specific to this Activity

The following specific criteria will be used in the evaluation of IMR proposals:

1. *Research merit and educational impact.* Assessment of the quality, innovation, and potential for success of the research and potential educational impact of the instrument. The potential of the research to lead to fundamental advances, new discoveries, and/or technological developments.

2. *Performance competence*. The capability/experience of the investigator(s) or senior personnel responsible, the technical soundness of the proposed approach, and commitment of institutional as well as other resources and adequacy of infrastructure.

3. *Essential need for the instrument.* The utility, impact or potential impact that the instrument will have on the proposed research and/or training/educational activities, or on a field of research.

4. *Impact on Infrastructure.* How the instrument will contribute to broader long-range goals of the institution, fields of science, and education.

5. *The ability of the applicants to operate and maintain the instrument*. Evaluation of the qualifications of the person(s) responsible for the instrument, allocation of time on the instrument, and provisions for operation and long-term maintenance of the instrument over its expected lifetime.

6. *Appropriateness of development plans*. For instrument development/construction, an assessment of feasibility, costs and schedule for completion, and plans for integration and use of the instrument in the research and educational activities described subsequent to the completion of the development/construction phase.

NSF staff will also consider the following factors in recommending instrumentation awards under this program: (1) the ability of the institution to provide an appropriate amount of matching funds, and the short and long-term commitment of the institution to the project; (2) the relevance of the proposed instrumentation to the research and educational activities and potential toward achieving national goals of strategic importance; (3) for instrument development proposals, the expected impact on all sectors of the materials research community and potential for enhancing linkages between sectors; and (4) the diversity of participants, program balance and geographic distribution.

A summary rating and accompanying narrative will be completed and signed by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, will be sent to the proposer.

AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made ***to the submitting organization*** by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Division administering the program. Verbatim copies of reviews, not including the identity of the reviewers, will be provided automatically to the Principal Investigator.

B. Grant Award Conditions

An NSF grant consists of: (1) the award letter, which includes any special provisions applicable to the grant and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) Grants awarded as a result of this announcement will be administered in accordance with the terms and conditions of NSF GC-1 (October 1998), Grant General Conditions or FDP-III (7/1/97), Federal Demonstration Partnership General Terms and Conditions. Copies of these documents are available on http://www.nsf.gov under "Grants and Awards;" and (5) any NSF brochure, program guide, announcement or other NSF issuance that may be incorporated by reference in the award letter. Electronic mail notification is the preferred way to transmit NSF grants to organizations that are eligible to receive electronic mail

capabilities and have requested such notification from the Division of Grants and Agreements.

These documents may be accessed electronically on NSF's Web site at: http://www.nsf.gov. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone 301.947.2722 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, (NSF 95-26) available electronically on the NSF Web site. The GPM is also available in paper copy by subscrition from the Superintendent of Documents, Government Printing Office, Washington, DC 20402. The GPM may be ordered through the GPO Web site at: http://www.gpo.gov.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Within 90 days after expiration of a grant, the PI is also required to submit a final project report. Approximately 30 days before expiration, NSF will send a notice to remind the PI of the requirement to file the final project report. Failure to provide final project reports delays NSF review and processing of pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

NSF has implemented a new electronic project reporting system, available through FastLane, which permits electronic submission and updating of project reports, including information on: project participants (individual and organizational); activities and findings; publications; and, other specific products and contributions.
Effective October 1, 1998: PIs are required to use the new reporting format for annual and final project reports; and all PIs supported by the Divisions within the Mathematical and Physical Sciences Directorate must submit reports electronically via FastLane. For those PIs who cannot access FastLane, paper copies of the new report formats may be obtained from the NSF Clearing House as specified above.

D. New Awardee Information

If the submitting organization has never received an NSF award, it is recommended that the organization's appropriate administrative officials become familiar with the policies and procedures in the NSF *Grant Policy Manual* which are applicable to most NSF awards. The "Prospective New Awardee Guide (NSF 97-100)" includes information on: Administration and Management; Accounting Systems Requirements and Auditing; and Payments to Organizations with Awards. This information will assist an organization in preparing documents that NSF requires to conduct administrative and financial reviews of an organization. The guide also serves as a means of highlighting the accountability requirements associated with Federal awards. This document is available electronically on NSF's Web site at: http://www.nsf.gov/bfa/cpo/oversite/guide/htm.

CONTACTS FOR ADDITIONAL INFORMATION

General inquiries should be made to the Instrumentation for Materials Research Program, Dr. Norbert M. Bikales, Program Director, Room 1065, Division of Materials Research, National Science Foundation, Arlington, VA 22230, telephone 703.306.1817, e-mail: nbikales@nsf.gov. For questions related to the use of FastLane, contact: Florence Rabanal, MPS FastLane Project Coordinator, 703-306-1998, e-mail:frabanal@nsf.gov.

OTHER NSF PROGRAMS FOR RESEARCH OR EDUCATIONAL INSTRUMENTATION

Related NSF programs for research instrumentation and instrument development are listed below. In NSF divisions that have no separate instrumentation program, needs are provided for in regular research grant programs.

NSF 98-10	Chemistry Research Instrumentation and Facilities
NSF 98-16	Major Research Instrumentation
NSF 98-54	Small Business Innovation Research
NSF 98-153	Small Business Technology Transfer
NSF 97-29*	Instrumentation and Laboratory Improvement
NSF 97-146*	Computer Information Science & Engineering Research Infrastructure

NSF 96-11* Improvements in Facilities, Communications, and Equipment at Biological Field Stations and Marine Laboratories

NSF 96-50 Earth Sciences Instrumentation and Facilities

NSF 96-90* Instrument Development for Biological Research

NSF 96-91* Multi-User Biological Equipment and Instrumentation Resources

NSF 96-113* Instrumentation Grants for Research in Computer and Information Sciences and Engineering

NSF 95-13 Social, Behavioral, and Economic Science Instrumentation

* Only available electronically

ABOUT THE NATIONAL SCIENCE FOUNDATION

The NSF funds research and education in most fields of science and engineering. Grantees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers, and educators. The Foundation strongly encourages women, minorities, and persons with disabilities to compete fully in its programs. In accordance with federal statutes, regulations, and NSF policies, no person on grounds of race, color, age, sex, national origin, or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF (unless otherwise specified in the eligibility requirements for a particular program).

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation regarding NSF programs, employment, or general information. TDD may be accessed at 703.306.0090 or through FIRS on 1.800.877.8339.

PRIVACY ACT and PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the review process; to applicant institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards, to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies needing information as part of the review process or in order to coordinate programs; and to another Federal agency, court or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator Proposal File and Associated Records," 63 *Federal Register* 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records, "63 *Federal Register* 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate and any other aspect of the collection of information, including suggestions for reducing this burden, to:

Mary Lou Higgs
Acting Reports Clearance Officer
Information Dissemination Branch
Division of Administrative Services
National Science Foundation
Arlington, VA 22230

YEAR 2000 REMINDER

In accordance with Important Notice No. 120 dated June 27, 1997, Subject: Year 2000 Computer Problem, NSF awardees are reminded of their responsibility to take appropriate actions to ensure that the NSF activity being supported is not adversely affected by the Year 2000 problem. Potentially affected items include, but are not limited to: computer systems, data bases, and equipment. The National Science Foundation should be notified if an awardee concludes that the Year 2000 will have a significant impact on its ability to carry out an NSF funded activity. Information concerning Year 2000 activities can be found on the NSF Web Site at http://www.nsf.gov/oirm/y2k/start.htm.

CFDA # 47.049

NATIONAL SCIENCE FOUNDATION
ARLINGTON, VA 22230

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K.W. 1009000

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