

**POSTDOCTORAL RESEARCH PROGRAM
U. S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL RISK MANAGEMENT RESEARCH LABORATORY
Cincinnati, Ohio**

Project #NRMRL 2003-01

Research Chemical Engineer - Remediation Pollution Prevention Research

The Environmental Protection Agency (EPA), National Risk Management Research Laboratory (NRMRL) in Cincinnati, Ohio, is currently seeking to place a postdoctoral researcher in the Sustainable Technology Division (STD). The project is available through the Postdoctoral Research Program at NRMRL.

The postdoctoral research involves the research and development of advanced membrane-based separation technologies to facilitate the deployment of pollution prevention into industrial production processes. Membrane technologies can be utilized to separate, fractionate, and concentrate contaminants or processes components. In general, they require minimal temperature changes and chemical addition, operate in either continuous or batch modes, use significantly less energy than traditional separation processes, do not alter the chemical structure of the processed materials, and are easy to integrate into existing processes due to their modular nature and compact size. These attributes provide cost-effective separation technologies that reduce waste, improve competitiveness, and so power the transition of industry to more sustainable technologies through deployment of pollution prevention-based production processes.

The goal of NRMRL's membrane research is to reduce and manage risks by applying pervaporation and vapor recovery technologies to strategic environmental separations, by developing membranes which address some of the limitations of pervaporation, and by evaluating the use of pervaporation and an alternative sorption process for generic pollution prevention applications.

The purpose of the postdoctoral research is to provide investigation to advance the state of the art in certain membrane separation processes, specifically pervaporation and sorption technologies. The researcher would act to expand NRMRL capabilities in this area and at the same time expand his/her own expertise, while gaining public recognition for research accomplishments.

The participant will be involved in the research and training activities including the following:

- Researcher will participate in a project in cooperation with a team of EPA engineers and scientists to develop cost-effective processes to separate mixtures of liquids of industrial importance. Engineering research studies will be conducted to evaluate the use of pervaporation for pollution prevention applications.
- Researcher will be responsible for planning and conducting experiments in support of the above objectives. These responsibilities include membrane preparation and characterization, equipment selection and apparatus assembly, literature reviews, engineering design studies, and bench-and/or pilot-scale experiments according to approved plans. Researcher will be responsible for preparing and executing quality assurance project plans and health and safety plans.

- Researcher will be responsible for the necessary sample acquisition and preparation, clean-up, quantitative analysis, data reduction and interpretation. Analytical methods may include, but are not limited to, PID and FID gas chromatography, UV-vis spectrometry, electron microscopy, potentiometric titrations, differential scanning calorimetry, and thermogravimetric analyses.
- Researcher will be encouraged to summarize research in the form of peer review journal articles. Writing and presenting research results for periodic briefings will be required.

For this project, experience in the areas of polymer science and membrane-based separation processes, particularly sorption and diffusion-based phenomena, would be extremely advantageous. Applicants should have received a doctoral degree in chemical engineering or a related field within three years of the desired starting date, or completion of all requirements for the degree should be expected prior to the starting date. Experience in the use of process software and some familiarity with MS C++ would be a strong plus. U.S. citizenship or permanent resident alien status is preferred. The participant will be selected based on academic records, publications, recommendations, research interests and background, and English communications skills.

The appointment is for one year and may be renewed for up to two additional years upon recommendation of NRMRL and subject to availability of funds. The participant will receive an annual stipend of \$52,650. Limited inbound travel and moving expenses may be reimbursed according to established policies. Also, limited funds will be provided for professional travel/training during the appointment. The participant must show proof of health and medical insurance. The appointment is full time at NRMRL.

For more information related to NRMRL, please visit their web site at <http://www.epa.gov/ordntrnt/ORD/NRMRL/>. The NRMRL research mentor is Subhas K. Sikdar. His curriculum vitae is included at the end of the project description.

Applications are accepted and processed on a continuing basis. The Postdoctoral Research Program for NRMRL is administered by the Oak Ridge Institute for Science and Education (ORISE). Please reference Project #NRMRL 2003-01 when contacting ORISE staff for information and application materials (e-mail contact preferred).

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Mail: Postdoctoral Research Program/NRMRL, Attention: Debbie Alcorn, Science and Engineering Education - MS 36; Oak Ridge Institute for Science and Education, P.O. Box 117, Oak Ridge, Tennessee 37831-0117

Curriculum Vitae (abbreviated)

Subhas K. Sikdar, Ph.D.

1995 - present **Director, Sustainable Technology Division, National Risk Management Research Laboratory, US EPA, Cincinnati, OH**

EPA Research's primary spokesman for pollution prevention, environmentally preferable technologies, and sustainable development. Responsible for EPA's multi-year research planning for pollution prevention and new technology (P2NT). Responsible for planning and implementing the Division's R&D, strengthening working relationships with EPA regulatory offices, other Government agencies (DOE, DOD, NASA, NSF, NIST, States, the Regions, NATO, and international). Responsible for extending professional outreach to technical societies (CCR, CWRT, Engineering Foundation, AIChE, ACS, EPA Research Centers, Universities, etc.).

Highlights: Established state-of-the-art research in computer-based methods for pollution prevention, environmental applications of membrane technologies, sorption technologies, innovative methods in green chemistry B major research programs all based on my initial ideas and all leading to CRADAs with the private sector (examples of CRADAs: process simulation software, solvent substitution software, membrane technologies, sorption technologies, metal finishing processes). Through outreach activities, established the Division as a bellwether for innovative approaches to pollution prevention and cleaner technologies, and recently to ecosystem protection and sustainability (core competencies of the Division).

1990 -1995 **Director, Water & Hazardous Waste Treatment Research Division, Risk Reduction Engineering Laboratory, US EPA, Cincinnati, OH 45268,**
1984-90 **Group Leader (Section Chief), Transport Processes, National Institute of Standards and Technology, Boulder, CO 80303**
1979-84 **Manager, Process Technology Unit (R&D for engineering thermoplastics), General Electric R&D Center, Schenectady, NY 12301**
1975-79 **Senior Research Engineer, additionally in charge of Crystallization Laboratory, Occidental Research Corporation, Irvine, CA.**

Significant Honors:

Fellow of AAAS (2002)
Larry K. Cecil Environmental Excellence Award, AIChE (2002)
Sartorius (India) Distinguished Speaker Award, Chemcon, Chennai, India, December 2001
Hon. Fellow, Indian Institute of Chemical Engineers, India, March 2001
Distinguished Alumnus Award, Calcutta University, India, January 2001
B.D. Tilak Fellowship Lecture, University of Bombay, India, January 2000
EPA Science & Technology Achievement Award, 97
Juror, Monsanto \$1 million challenge contest
AIChE Fellow (1996)
EPA Bronze Medals B three times (1991 and 2002)
R&D 100 award 1990

Publications and Patents:

64 technical publications in peer-reviewed literature. 20 US patents, several pending, 6 ASTM standards from E48.03 on Biotechnology, 16 industrial reports for OXY and GE, and 5 NATO CCMS Annual Reports on the Pilot Study, Clean Products and Processes.

Edited ten books on: bioprocessing (CRC Press, ACS), separation technologies (ACS, AIChE), particulate processes (AIChE), bioremediation (Technomic, 1997), tools for pollution prevention (Kluwer, 1999), and process design tools for the environment (Francis & Taylor, UK, May, 2001).

Chief Editor, and founder of Clean Technologies and Environmental Policy published by Springer-Verlag, Heidelberg, Germany (formerly Journal of Clean Products and Processes), Editorial Board member, Gas Separation and Purification (85-91), Indian Chemical Engineer (1994-).

Professional Activities:

Director, NATO Advanced Research Workshop on Technological Choices for Sustainability, Maribor, Slovenia, October 13-17, 2002.

Chair, AIChE's Sustainable Engineering Forum (2002), first Chair of newly formed organization

Member, Advisory Panel, CPI Technology, World Market Research Centre, London (UK)

Vice President, US Chapter, Indian Environmental Association, Chicago, IL

Leader (invited) of Technical Expert Group on Environmental and Hazardous Wastes, Thai Center of Excellence, Bangkok, 2001 B

Advisor to a five university consortium Center headquartered at Chulalongkorn University on hazardous wastes and clean technologies. Monitor its progress to achieve world-class status in research and education. Funded by Asia Development Bank and the Thai Ministry of University Affairs.

Member, EPA Council on Regulatory Environmental Modelling (CREM), 2000 B Represent EPA Office of R&D in formulating policies for harmonizing mathematical modeling throughout the Agency

Member, EPA Biotechnology Steering Committee, 2002 B

Represent the National Risk Management Research Laboratory in efforts to develop tools and methods for managing risk from GM crops and evaluating benefits

EPA Representative to the Council for Chemical Research, Steering Committee member of Chemical Industry Vision 2020 (1995 -2000), Chair, CCR Awards Committee (2001) and member (1998-2002), and co-Action Network Leader, Long Range Issues (2000- 2002); Organized the workshop for Sustainability and Industry in the CCR Annual Meeting in Cincinnati, March, 2002 (co-sponsored by DuPont and CCR)

Member, AIChE Research and New Technology Committee (1988 -)

Assist in programming in new areas. For instance, organized a six-session topical conference on Sustainable Engineering, for the AIChE Annual Meeting in Indianapolis, November 2002 to be followed by another in 2003 in San Francisco

Director (and Founder), NATO CCMS Pilot Project, Clean Products and Processes, 1997-

Created a forum for discussing issues of cleaner production and sharing state of the art technical information among representatives from NATO, Mediterranean, and former Soviet Block nation

Member, International Advisory Board, Indian Society of Life Cycle assessment (2001 -)

Member, Dean's Industrial Advisory Boards of University of Arizona College of Engineering (2000 -), and of the Chemical & Environmental Engineering Department (1994 -), University of Colorado Center for Membrane Technologies (1991-98), Michigan Technological University CENCITT (1995-98), NJIT HSRC (1991-95), Lamar University Gulf Coast HSRC (1991-93), UCLA Environmental Technology Center (1997-98), Illinois Institute of Technology (2000 -), University of Kentucky IGERT Program (1999 -).