

Proposed University of Arkansas Membrane Research Center (UA MRC)

1. Name of the College, School, Department, or Unit in which the Center will be hosted

The College of Engineering, Ralph E Martin Department of Chemical Engineering will be the administrative home for the UA MRC.

2. Name and Title of the Person proposing creation of the Center

Dr. Ranil Wickramasinghe will be the Center Director. He is a professor in the Department of Chemical Engineering and holds the Ross E Martin Chair in Emerging Technologies. He is also an Arkansas Research Alliance (ARA) Scholar.

3. Type of Center and Focus

Research

The proposed UA MRC will be a site of the MAST Center. The MAST Center focuses on performing precompetitive research for its industrial sponsors. Features of the UA MRC are:

- Consists of industrial and agency sponsors who provide the primary financial resources for the Center
- Establishes a research agenda focused on shared technical interests and opportunities
- Shares the research results developed by the Center among the Center sponsors

The Mission of the UA MRC is:

- To contribute to the nation's research infrastructure base by developing long-term partnerships among industry, academe and government.
- To leverage NSF funds with industry to support graduate students performing industrially relevant research.
- To expand the innovation capacity of the nation's competitive workforce through partnerships between industries and universities.

4. Value of program to University of Arkansas

The UA MRC is the only membrane research center in Arkansas. Further the MAST Center is the only NSF Industry and University Cooperative Research Center that focuses on membrane science and technology. Membrane based separation processes offer unique opportunities to develop low cost sustainable separation processes in fields ranging from water treatment to biopharmaceutical manufacturing. The UA MRC could enable the University of Arkansas to be a leader in this field.

The UA MRC focuses on conducting high quality research in accordance with the University's goal of being recognized as a research intensive public institution. In particular the UA MRC adds value to the University by:

(1) Conducting fundamental and applied research in the field of membranes via innovative materials and processes to facilitate the use of membrane technology for current and emerging industrial applications and providing postdoctoral researchers, graduate and undergraduate students with unique research opportunities

(2) Helping sustain U.S. technological leadership in membrane materials and membrane-based separation processes and accelerating commercialization by Center sponsors of novel, sustainable and innovative technologies

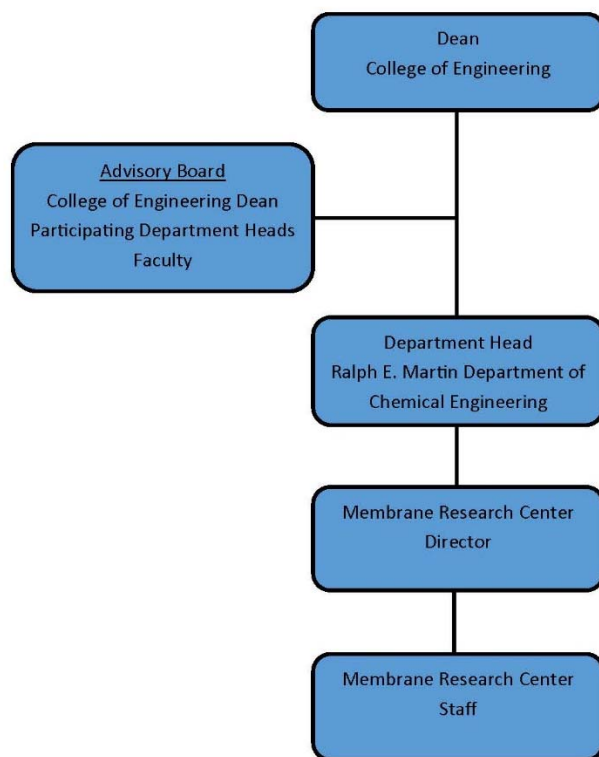
(3) Providing undergraduate, graduate and postdoctoral researchers with a superior educational and research experience that will enable them to become productive and effective professionals in the membrane community

(4) Providing networking opportunities for students and faculty with industrial sponsors

- (5) Promoting industry/university collaborations
- (6) Contributing to the University and State objective of developing a highly trained workforce in Arkansas

5. Information on the Director Position and Organizational Structure

The Center staff report to the Center Director. Further the operational direction of the Center will be provided by the Center Director. The Center Director will report to the Dean of the College of Engineering. Oversight of Center operations will be provided by the Dean of the College of Engineering as well as the Department Heads of the participating departments (currently Biomedical, Civil and Chemical Engineering). The Dean of the College of Engineering together with the heads of the participating departments will form the Center Advisory Board.



6. Identification of Faculty

Each year the center will issue a call for proposals. Project selection is at the discretion of the MAST Center Industrial Advisory Board members. The Industrial Advisory Board consists of the industrial sponsors from all three MAST Center Sites (not just the UA MRC). Any faculty member at the University of Arkansas may respond to the call for proposals. If the proposal is selected for funding, the faculty member will be the PI of the project and will become a participating faculty member. In addition, the UA MRC (in conjunction with the MAST Center) holds semi-annual meetings that rotate between the three MAST Center sites. All UA faculty may attend these meetings.

7. Student Involvement

The most important component of the mission of the UA MRC is promotion of education and training opportunities in membrane science and technology especially for graduate students. Graduate students (PhD and MS level students) form the backbone of all UA MRC research teams. Graduate students will conduct their thesis research through UA MRC projects. A unique feature of UA MRC research projects is that every project will have at least one of our industrial sponsors as a project

mentor. The students will interact with these industrial mentors (e.g. through on-site meetings, meetings on campus, conference calls) at least once a month. Thus students will gain insights into practical problems related to their thesis research as well as life in an industrial research group.

Every 6 months the UA MRC will hold a project review meeting in conjunction with the MAST Center. The meetings will rotate between the three MAST Center sites. All graduate students working on UA MRC projects will give an oral or poster presentation at these meetings. All the MAST Center industrial sponsors will attend these project review meetings. In addition each student will attend a mentoring session for face to face discussion with project mentors. The project review meetings will provide our graduate students with unique networking opportunities. Further many of our industrial sponsors are likely to hire graduate students who have worked on UA MRC projects.

The UA MRC will also provide research opportunities for undergraduate students. Supplemental funding opportunities exist for funding undergraduate students e.g. the National Science Foundation has supplemental funding opportunities for Industry and University Cooperative Research Centers. The UA MRC could compete for this funding. Undergraduate students will work on a project with a graduate student. Undergraduate students will also attend the 6 monthly project review meetings and present a poster. They will also attend project mentor meetings etc.

8. Annual Budget

The proposed UA MRC is currently funded through the National Science Foundation with funding at the level of \$60,000 per year. The Vice Provost for Research and Economic Development has provided \$50,000 a year while industry membership fees are currently \$50,000 per year. The UA MRC currently has 5 sponsors. The budget for 2016 is \$360,000.

The UA MRC aims to add a new sponsor each year. However it is likely that occasionally sponsors may leave the UA MRC depending on their internal priorities. We estimate an annual budget of around \$360,000. This will require the UA MRC to maintain a base membership of at least 5 sponsors. National Science Foundation funding is expected to be steady until 2019. In 2019 a renewal proposal will be submitted. The new level of funding is not known at present as it is likely new program guidelines will be published in the next 18 months.

9. Financial Resources

As indicated above (8. Annual Budget) the UA MRC has two sources of funding: industrial sponsors and the National Science Foundation. It is expected that the industrial membership fees will increase to \$60,000 in the next 12 months. As indicated National Science Foundation funding will remain at \$60,000 per year for the next three years. We estimate a steady level of funding around \$360,000 per year.

10. Space and Equipment Needs

UA MRC projects will be led by a faculty member (principal investigator) at the University of Arkansas. His/her graduate students will be funded by UA MRC. The work will be conducted in the principal investigator's laboratory. Thus UA MRC projects will use laboratory and office space already provided by the principal investigator's host department (Biomedical, Civil and Chemical Engineering).

All UA MRC projects will make use of existing equipment the University of Arkansas. UA MRC funding is targeted for funding researchers the majority being graduate students. There is no funding available for new equipment purchases. UA MRC projects make use of specialized equipment in the principal investigators laboratories e; g; atomic force microscope, high performance liquid chromatography, membrane bioreactors as well as equipment available to faculty through the Arkansas Nano-Bio Materials Characterization Facility.

11. Administrative Control Lines

The Center director is responsible for all center operations. He/she reports to his/her department or unit head who in turn reports to the Dean of the College of Engineering. As the UA MRC involves participation by more than one department in the College of Engineering, ultimate authority for the UA MRC rests with the Dean of Engineering.

12. Advisory Board

As described in Section 5, the UA MRC advisory board will consist of the following permanent members: Dean of the College of Engineering, Department Heads of the participating departments; Biomedical, Civil and Chemical Engineering. In addition the Dean of the College of Engineering will elect two outside representatives from among our industrial sponsors and two faculty members from the University of Arkansas Fayetteville. These 4 advisory board member will serve 1 year terms which may be renewed. The advisory board will meet twice a year.

13. Center Evaluation

The overall MAST Center has an external evaluator who provides a comprehensive evaluation of the MAST Center's activities every year. The evaluator will provide specific input for the UA MRC (which is a site of the MAST Center). Thus the evaluation will provide data on both the UA MRC as well as the entire 3 campus MAST Center. Factors that are considered in the evaluation include:

- Sponsor satisfaction that the UA MRC provides real value for the sponsor's investment
- Research output: student graduated, papers published, patents filed, conference presentation given etc.
- Faculty involvement: number of faculty and number of units involved
- Center viability: number of industrial sponsors, center funding levels
- Student survey results that focus on student impressions of the research and training opportunities offered by the UA MRC.