

## V. DIVERSITY

### 1. DIVERSITY OBJECTIVES

The CMDITR's commitment to diversity is a core value, and proactive steps have been taken to improve diversity at all of levels in CMDITR's personnel (students, postdoctoral fellows, faculty, advisory board members, and staff). The long-term objective of the CMDITR is to contribute to building a science and engineering workforce that is reflective of the national profile in both gender and ethnicity. The CMDITR is moving toward this goal by creating future leaders who understand the value of diversity and regardless of their ethnicity or gender, have a commitment to enhancing diversity in the information technology research and development workforce of the nation.

The CMDITR has initiated strategic efforts to improve diversity among its members and constituents. Further enhancements in diversity will be achieved by specifically participating in and designing programs that:

- Increase awareness in all CMDITR members regarding the need for and intrinsic value of diversity.
- Provide CMDITR members with training and activities that promote work and learning environments that support excellence for all.
- Increase diversity among CMDITR personnel (students, postdoctoral fellows, faculty, advisory board members, and staff).
- Provide CMDITR members from underrepresented groups with support and mentoring to improve their retention in undergraduate and graduate programs.
- Strengthen partnerships with minority institutions to further increase research and educational collaborations.
- Engage targeted populations on a broader scale with enabling tools and assistance.
- Recognize and strengthen CMDITR's presence in K-12 mathematics and science education with special emphasis on underrepresented student populations.
- Facilitate further collaborations at all levels (K-12, Undergraduate and Graduate) by increasing outreach presentations and projecting a positive image of science, engineering and technology careers to underrepresented groups.

In order to support these key goals, the following actions have been implemented:

1. The CMDITR has increased the diversity of our faculty participants by recruiting new PIs into Center programs (see VI.1) and into Center Management. The Center continues in its efforts to increase diversity by influencing departmental appointments of new faculty at all partner institutions. CMDITR will provide all new participants with a supportive environment that includes mentoring to support their career objectives and whenever possible, reasonable financial support for their research and educational efforts. Research has shown that minority faculty role models positively influence students from underrepresented groups in regard to their career aspirations and retention in degree programs.

2. CMDITR has strengthened its collaborative relationships with Historically Black Colleges and Universities (HBCUs) and Minority Universities (MUs). Our core effort continues to be the development of a new Ph.D. program in Advanced Materials

Science and Engineering at Norfolk State University (an HBCU), including production of graduate course instructional materials and assistance with fund raising.

3. The CMDITR has entered into its second year of partnership with the National Consortium for Graduate Degrees for Minorities in Engineering and Science (GEM). This partnership was formed for the explicit purposes of: a) increasing the visibility of unique educational opportunities offered by Science and Technology Centers and b) recruiting minority students into STC science and engineering graduate programs. CMDITR independently funded the first-ever GEM-STC Fellow in 2005 and hopes to add up to 4 additional GEM Fellows to its student roster by fall 2006. CMDITR will continue to uphold its commitment to independently fund at least one GEM-STC Fellow each year.

4. CMDITR personnel continue to participate in public outreach activities and provide resource material to impact the career decisions of individuals from underrepresented populations. Special outreach efforts and initiatives are directed at women, Native Americans, African Americans, and Hispanic populations. These efforts provide students with an understanding of the demands of graduate studies in science or engineering and the many resources available to them. This is an essential element to seeding the enhancement of diversity in the workforce.

5. CMDITR has committed funding for the recruitment of graduate and undergraduate students from underrepresented groups into Center activities. CMDITR is designing and implementing partnership recruitment initiatives with key minority-serving organizations, and providing gateway REU experiences as a means of enhancing diversity in the workforce pipeline. In addition to its interaction with GEM, the Center has allocated special fellowship funding for underrepresented students who are already enrolled at partner institutions.

## **2. DIVERSITY PERFORMANCE AND MANAGEMENT INDICATORS**

CMDITR continues to implement vigorous inclusive strategies to increase diversity at all levels and in all activities of the CMDITR. The increased numbers of individuals from underrepresented groups participating in the Center can be used as an indicator of the CMDITR's effectiveness in this area; however, ultimate "success" can only result from initiatives and relationships fostered with constituent groups over a period of years. Therefore, a realistic assessment of the CMDITR's performance in diversity enhancement should take this time requirement into account. A demographic analysis of our funded faculty, student/postdoctorate, and staff populations is presented in VI.1.b. Parallel analyses can be conducted using the information presented in VIII.7 or found in our online internal database (special permission required). CMDITR has identified the following as key diversity performance and management indicators:

- Number of underrepresented minority students applying to and accepted by CMDITR programs
  - *REU recruitment statistics for 2005 are discussed in III.4.a and IV.4. UW and GT are pursuing several minority students who have been accepted into graduate programs at their respective campuses to work on Center research projects with CMDITR faculty. This is the first complete year that the CMDITR has used the new GEM-STC website and the GEM applicant database in order to recruit potential graduate students. In Spring 2005 we funded our first GEM Fellow, an African-American female, who is completing her first year of graduate studies at GT. We anticipate the enrollment of up to four additional GEM Fellows in CMDITR graduate programs in Fall 2006; two of whom*

would be funded by CMDITR (via NSF-URG and internal funds) and the other two by a GEM sponsoring company. QEM is sending its first PhD student to CMDITR in Summer 2006 for an internship in the laboratory of Dr. Antao Chen at UW. Numbers of female graduate students taking part in Center activities remains high (see VI.1.b and VIII.5). Among our funded graduate students and postdocs are 7 African Americans, 5 Hispanics, and 25 women.

- Number of CMDITR participants involved in diversity-enhancing activities
  - This is a difficult number to gauge, but it includes a substantial fraction of our 204 active participants (see membership breakdown in VI.1.b). Most of our funded staff (16) and faculty (33) are directly involved and at least 50 graduate students and postdoctorates engage through our large REU program alone. In the future, students and postdocs will play an even larger role as they become more involved in our graduate course development, partnership with GEM, and hosting of NSU REU students. Over the past 2 years, CMDITR students have worked in inner-city high schools assisting chemistry teachers, and given lab tours to high school students from local school districts. These activities give high school students exposure to CMDITR research and the chance hear about the opportunities afforded by obtaining a college education in science and engineering.
- Number of minority-rich institutions engaged in research collaboration and curriculum development with CMDITR
  - CMDITR is collaborating in research and/or curriculum development with the following minority-serving institutions: Norfolk State University, University of Maryland Baltimore County, and New Mexico Highlands University. NSU and UMBC were formally added to our cooperative agreement effective Aug. 1, 2005.
- Number of faculty members within the CMDITR that are from under-represented groups
  - As discussed in VI.1, the proportion of funded faculty from underrepresented groups has steadily climbed in years 1-3 from 17% to 30%. As a consequence of our year-3 reorganization, 45% of our 33 funded faculty in year-4 are women or minorities. This proportion includes 6 women, 6 African Americans, and 3 Hispanics.
- Percentage of new faculty invited to join the CMDITR that are from underrepresented groups.
  - Since August 2005, 12 new faculty have been added to the funded PI roster. Of these, four are African American, one is Hispanic, and three are women (with no overlap between these groups). Therefore, 67% of the new recruits come from underrepresented groups.

### **3. DIVERSITY PROBLEMS**

Prior to the hiring of Dr. Oden in December 2004 as Diversity Director, there was a four-month vacancy period that temporarily diffused some of the CMDITR diversity initiatives. With Dr. Oden providing consistent leadership for CMDITR's diversity efforts in year-4, diversity projects and initiatives have gained in momentum, effectiveness, and scope. Under the leadership of Dr. Oden and Profs. Dalton, Mescher, Marder and Black, the CMDITR has implemented programs and activities to attract women and underrepresented minorities into the research environment very early in their research career. The Center is also developing programs to recruit and mentor minority graduate students.

The CMDITR strives to emphasize the importance of diversity to its membership. We are in the early stages of planning and providing professional training and development activities that address issues such as diversity, gender, increased retention, and career development. The Center is working closely with partnering institutions and Center members to establish such

programs (described in more detail in Section IV.4) The programs will include a Leadership Lunch Lecture Series that features speakers to address gender and diversity issues as well as professional development. In addition, the CMDITR will sponsor nine female graduate students and postdocs to participate in the annual professional development workshop developed by the Committee on the Advancement of Women Chemists (COACH). Underrepresented CMDITR students will continue to attend GEM's annual Future Faculty and Professionals Symposium. The Center is also contemplating increased activities to enhance current diversity and gender activities at the CMDITR Annual Retreat.

Another concern of the CMDITR relates to the GEM-STC Partnership. We are working to establish a sustainable plan among all 7 STC partners to continue funding fellowship candidates after the URG GEM Fellowship funds for 2006-07 are exhausted. The CMDITR continues to lobby partner STCs to commit resources and funding for future fellows. The CMDITR will continue its leadership role in the GEM-STC partnership by exploring new avenues of support and setting the example by committing internal funds for at least one GEM Fellow each year.

The recruitment of women and minorities into faculty and postdoctoral positions continues to be a significant Center concern. To address this, the Center is working closely with high-level administrators at partner institutions to ensure that the respective universities are proactive in recruiting underrepresented candidates and adhere to an unbiased selection and hiring process. While CMDITR does not directly hire faculty, in some cases its faculty members have influence to provide supportive recommendations. The Center has itself aggressively sought mutually beneficial collaborative research relationships with faculty from underrepresented groups; for example, Samuel Graham, Elisa Riedo, Carl Bonner, Scott Saavedra, Anthony Johnson, Peter Delfyett, Lih Lin, and Denise Wilson have all been recruited within the last two years. The UW MSE department is in active negotiations with a female faculty candidate whose research interests are well-aligned with those of CMDITR. We hope that she will be able to join the Center in year 5.

The CMDITR is continuously challenged to increase the diversity in its student population. To address this, the CMDITR is developing and strengthening partnerships with minority-serving institutions. In the jointly sponsored NSF Future Tech Conference (detailed description in IV.4) the CMDITR sponsored 25 underrepresented students to participate in an undergraduate research and career workshop. Another recruitment tool developed in year-4 is Georgia Tech's Faculty FOCUS on Chemistry Program. This event leveraged funds and resources to successfully recruit underrepresented students and faculty (see IV.4) into our REU program, graduate programs, and faculty research team. CMDITR members have attended conferences and meetings sponsored by minority-rich science and engineering organizations, such as the Louis Stokes Alliance for Minority Participation in Science, Technology, Engineering and Mathematics (LSAMP), the National Society of Black Engineers (NSBE), Society of Advancement of Chicanos and Native Americans in Science (SACNAS), National Society of Black Physicists (NSBP), Society of Hispanic and Professional Engineers (SHPE), the National Organization for the Professional Advancement of Black Chemists and Black Chemical Engineers (NOBCCChE) and the GEM annual symposium. We plan to continue our membership's rich interactions with these minority-serving institutions by promoting events and encouraging and funding attendance at these conferences.

#### **4. DIVERSITY ACTIVITIES AND IMPACTS**

##### CMDITR personnel

In December 2004, we welcomed Dr. Keith Oden as Diversity Director. Under his leadership, the CMDITR developed a more complete and ambitious plan for diversity enhancement that will be implemented across all members institutions. The CMDITR has established cohesive strategies among students, faculty, and staff which we will describe in this section.

To assist in these efforts, the CMDITR assisted the UW administration to hire a full-time diversity graduate recruiter, Sibrina Collins. While Ms. Collins is not a CMDITR personnel, her mission of diversity enhancement meshes well with Center goals. It is anticipated that she will partner with UW Professors Ann Mescher and Larry Dalton of the CMDITR's Diversity Team to implement far-reaching initiatives that will be mutually beneficial for the Center and UW.

A major step forward for the Center in years 3-4 was the addition of 12 key faculty to our membership. Many of these faculty members, in addition to being excellent researchers and scientists, have been heavily involved in diversity outreach efforts prior to joining the Center. The CMDITR will leverage their expertise and commitment to enhance the Center's diversity objectives and goals.

Dr. Peter Delfyett is a prime example of a person committed to enhancing diversity. Prof. Delfyett, an African American faculty member at the University of Central Florida, has received numerous awards including the National Science Foundation's Presidential Early Career Award for Scientists and Engineers (PECASE), the 1999 Distinguished Researcher of the Year Award, the 2000 Black Engineer of the Year - Outstanding Alumnus Achievement Award, and named by Science Spectrum Magazine as an Outstanding Black Professional in Science. Dr. Delfyett has spearheaded efforts and designed several programs focused on college preparatory and career outreach to help underrepresented and disadvantaged students interested in the STEM disciplines. He also has served as an important minority role model and mentor to students pursuing degrees in science and engineering disciplines.

To assist the Center's Diversity Team, Prof. Suely Black, a faculty member at Norfolk State University (NSU), was appointed as Associate Director for Diversity. As mentioned in Chapter III, Dr. Black is one of the key NSU faculty members working to develop and implement a Ph.D. program in Materials Science and Engineering at NSU. Besides having an excellent record as a researcher and teacher, her involvement with student and professional organizations and recruitment activities, will greatly enhance the Center's diversity initiatives. Dr. Black joins Ann Mescher, Larry Dalton, and Sam Graham (effective 8/06) as CMDITR Diversity Team members who are themselves from underrepresented groups.

CMDITR Director Larry Dalton continues to be recognized nationally for his work in diversity and for advising Norfolk State University (NSU) and Alabama A&M as they develop new Materials Science and Engineering Ph.D. programs. Since 2002 Larry has served as the Chairman/Member of the External Advisory Committee for the Center for Research and Education on Advanced Materials at Norfolk State University. This year he began his term as a Member of the External Advisory Committee for the NSF HBCU/RISE Center at Alabama A&M University.

##### Norfolk State University Partnership and PhD Program Development

With help from 2004 NSF Under-Represented Group (URG) project funding, the CMDITR continues efforts in assisting to establish a new Ph.D. program in Advanced Materials Science

and Engineering at Norfolk State University (NSU), a historically black university. NSU had an excellent site visit in February 2006, and at the time of this writing, NSU's administration is planning for a Fall 2007 program start. To assist in the recruitment efforts for the Fall 2007 class, UW Prof. David Ginger will help facilitate a Ph.D. recruitment workshop in Summer 2006. When the program begins in Fall 2007, it will be NSU's second Ph.D. program and only the second MSE Ph.D. program at an HBCU.

The CMDITR assisted with development of the PhD program curriculum last year by co-instructing a course in Spring 2005 on advanced optoelectronic materials. For Spring 2006, this course is being taught on-site by NSU faculty. To enhance the course content, recorded course lectures from last year are being used alongside new material provided by NSU facilitators. In April and May 2006, three additional STC faculty from UW, GT, and UMBC are scheduled to visit NSU to give lectures for this course.

To further facilitate research interactions between the STC and NSU PIs, GT hosted 7 NSU REU students as part of an exchange program last year. In addition, 3 NSU students participated in the Future Tech Conference (see IV. 4) and 2 NSU students will take part in the 2006 HoP REU program.

Under the auspices of the Travel Grant Program, Profs. David Ginger, Larry Dalton and Alex Jen (UW) recently hosted two NSU students. Both students were admitted into UW's Ph.D. program to work with Profs. Jen and Dalton beginning Fall 2006. One of the newly admitted doctoral students is a 2006-07 GEM-STC Fellow. The recruitment of these two students is extremely significant because they are fruits of a nascent collaboration. This accomplishment is also indicative of the positive impact that collaborations with minority-serving institutions can have on diversity enrichment efforts. Further partnerships with NSU include a planned FutureTech Conference at NSU (see IV.4), mentoring workshop at NSU, formalization of undergraduate and graduate research ties, as well as recruiting collaborations and support of educational programs in the form of course modules and lectures.

Because of the Center's successful partnership with NSU, HBCUs Jackson State and Alabama A&M are very interested in forging closer ties with the CMDITR in order to develop similar programs and collaborations. These relationships and with the implementation of NSU's new Ph.D. program will make a significant contribution to increasing workforce diversity in the areas of information technology, materials science, and nanotechnology.

#### GEM-STC Partnership

The CMDITR has been proactive in further strengthening its minority recruitment program. CMDITR Deputy Director Seth Marder has been active in working with the Executive Board of the National Consortium for Graduate Degrees for Minorities in Science and Engineering (GEM) to develop and implement strategies that increase diversity in the engineering and science workforce. He was recently appointed to the GEM Board of Governors. This partnership with GEM was spearheaded by the CMDITR as a direct result of a 2004 NSF-URG award for \$100,000 to sponsor the first ever GEM-STC Fellowships. In Spring 2005, the CMDITR (using internal funds) awarded the first GEM-STC Fellowship to Myneeka Cook at Georgia Tech. The CMDITR is committed to independently funding a GEM-STC Fellowship each year.

The CMDITR is in the second year of its unique partnership with GEM. The Center continues to lead a multi-STC partnership effort involving six other STCs encompassing 41 universities. As a resource to positively influence minority recruitment and enrollment in science and engineering

programs in STCs nationwide, the CMDITR created an online “Match-Maker” system. This GEM-STC website pairs prospective minority graduate students with the STCs that most closely match their research interests. This resource greatly enhances the partnership by enabling STCs to directly contact and recruit minority students who are good candidates for their research programs.

Thus far, the partnership has awarded 3 GEM-STC Fellowships seeded with URG funds and a fourth will be awarded in May 2006. With the success of its first year, the GEM-STC partnership is on the road to proving its value to STCs, thereby providing a case for sustained funding of the program.

As another component of this partnership, the CMDITR coordinated the recruitment activities for the seven STCs to participate in GEM’s Annual Future Faculty and Professional (FFP) Symposium in Boston in June 2005. The symposium covered comprehensive topics including thesis and proposal writing, mentorship, career tracks in industry and academia, and entrepreneurship. Fourteen underrepresented students and eight faculty members from the seven STCs participated in the symposium. Prof. Marder served on a panel for the mentorship segment. Also, as part of the partnership-building activities, a coordinated “STC Information Session” provided relevant information about fields of study, fellowships, graduate study, and career opportunities within the STCs. The CMDITR also covered the cost of a student reception. These activities will continue annually, and all partnering STCs have pledged to participate.

#### FutureTech Conference

CMDITR participated with three other STCs to offer a hands-on workshop for minority students in September 2005. Over 100 Hispanic, Native American, and African American undergraduate students from approximately 30 institutions attended. Student evaluations from the event were very positive. A typical quotation reads as follows: “Overall I just can’t thank you enough for making it possible for me to attend the event. It made me think in depth about my future options of graduate studies.”

Based on last year’s success, CMDITR will participate in FutureTech again this year with a primary goal of having the event hosted at a minority institution such as NSU, and with a larger number of minority participants.

#### Faculty FOCUS on Chemistry

Spearheaded by Dr. Keith Oden, the CMDITR leveraged funding and resources with partner institution Georgia Tech to provide a unique recruitment experience for underrepresented faculty members and their students. Ten chemistry faculty members from minority-serving institutions and 30 of their high-achieving chemistry undergraduate students attended the 3-day colloquium on “The Importance of Underrepresented Students Pursuing Graduate Degrees in STEM Disciplines”. This colloquium proved a fertile recruiting ground. Four participants will join the CMDITR’s 2006 Hooked-on-Photonics Summer REU program and another eight students were accepted into Ph.D. programs at CMDITR institutions for Fall 2006. Two of the successful graduate applicants, Kristina Lord and Jelani Griffen, will be attending UW and GT, respectively; and will join CMDITR’s research team.

Faculty FOCUS on Chemistry participants came from the following minority-serving institutions: Norfolk State University, Hampton University, North Carolina A&T University, Morehouse, Spelman College, Tuskegee University, Texas Southern University, Howard University, Hampton University, Florida A & M University, Xavier and Jackson State University. This

program is another example of how the CMDITR is having a major impact in increasing diversity in the science and engineering workforce.

Because of this year's success, the CMDITR is planning to expand the program for next year. Key goals will be to nurture the newly-created relationships with faculty members and institutions, develop collaborative research and education partnerships, and expand the program to increase the overall number of students. In addition, special effort will be made to encourage participation from Native American and Hispanic-serving institutions. CMDITR outreach efforts will continue to focus on select institutions, faculty members, and professional organizations affiliated with these underrepresented groups.

#### Center-wide Education and Diversity-Enhancement

CMDITR recently surveyed its postdoctorate and graduate student members to assess the level of interest and need for a mentoring program and professional development series. Over 90% indicated an interest in a professional development series, and over 70% percent indicated a desire to have a mentor in addition to their thesis advisor.

In recognition of the University of Washington's Presidential Award-winning mentoring program and training curriculum, CMDITR is partnering with the UW's Center for Workforce Development and its Executive Director, Dr. Suzanne Brainard, to implement a mentoring program for Center graduate students and postdoctorates. A select group of CMDITR staff members will be trained to recruit and match mentors with students, administer a professional development series, track students and administer surveys, and evaluate the mentoring program's effectiveness.

CMDITR has launched a Leadership Lunch Series at UW for women and minority graduate students in science and engineering. Invited talks are held monthly, featuring women and minority faculty from engineering, math, and the sciences. During the next phase, leaders from our industrial affiliates will be invited to visit CMDITR's member institutions. During these visits, the industrial leader will meet with students over lunch, give a technical presentation, and plan collaborations with CMDITR faculty. This also presents a great opportunity for our students to investigate internship and mentoring possibilities.

Through the Center's participation (GT, UW) with NSF's ADVANCE program, the CMDITR contributes to the enhancement of women in the scientific and engineering workforce and to the advancement of their careers in academic science and engineering. CMDITR Deputy Director Seth Marder participated in Georgia Tech's annual ADVANCE workshop as a "faculty coach" for three female assistant professors in modern languages, industrial and systems engineering, and biomedical engineering. In another ADVANCE seminar, Dr. Marder served as a panelist for a workshop on proposal development, providing guidance on how to compete for funding and how to get involved in centers.

Additional efforts to support women in academic scientific and engineering careers are initiated at the institutional level by faculty members' involvement in student and professional chapters of organizations such as GT's Women in Chemistry (WIC) group, the Society of Women Engineer's (SWE), Women in Engineering Program Advocates Network (WEPAN), and the Committee on Women in Science and Engineering (CWSE). The Center continuously seeks to recruit women at all levels (faculty, postdoctorates, and students), support new approaches to improving the climate for women, and facilitate women's advancement to the highest ranks of academic leadership.

### External Education and Diversity-Enhancement

The CMDITR has strengthened existing partnerships with education and research programs that incorporate diversity enhancement. The Center continues to partner with key organizations that greatly enhance diversity through strategic leveraging of NSF support and other resources. This includes the strengthening of existing partnerships with organizations such as Georgia Tech's Center for Education Integrating Science Mathematics and Computing (CEISMC), and UW's K-12 Institute for Science Mathematics Education (which encompasses programs such as MESA, Gear-up, etc.). Research experiences are offered to teachers through programs such as Georgia Tech's GIFT program and those administered by the CMDITR's Education and Partnership Programs Office.

Dr. Rachel Morgan Theall's NSF Discovery Corps Fellowship has enabled her to work with local high school students to create exhibits as part of an ongoing collaboration with the Flandrau Science Center in Tucson. This program is described in more detail in Section III.2a. During the 2005-2006 school year, Dr. Morgan Theall has worked with 25 students from two local high schools to develop two separate exhibits. The high schools involved in the projects serve predominantly underrepresented groups with high Hispanic and Native American populations.

Georgia Tech's CMDITR graduate students Kelly Lancaster (2005) and David Duckworth (2006) participated in GT's Student and Teacher Enhancement Partnership (STEP) Program. During the academic year they worked with teachers and high-risk minority students in the metro-Atlanta area on activities such as: 1) Student instruction, 2) Teacher professional development, 3) Student enrichment and mentoring, 4) Implementation of classroom websites, and 5) Science fair project assistance. In addition to the help that Kelly and David provided to students and teachers, they themselves gained leadership skills and valuable teaching experience.

Dr. Vicente Talanquer (UA) was awarded an Improving Teacher Quality (ITQ) grant to develop web modules that allow users to explore specific scientific concepts primarily through a series of manipulatives. The modules are designed to support materials for core components of the physical science curriculum in grades 6-12, and are based on technical applications related to the Center. (This program is described in more detail in Section III.2a.)

During year-4, Prof. Talanquer worked with 11 secondary school science teachers from 8 different schools in Tucson to develop 8 web-based interactive educational modules. These modules are currently being tested by the secondary school teachers in their classrooms. Six of the 8 participating schools serve predominantly underrepresented groups with student enrollment percentages ranging from 51% to 100% Hispanic, Native American, or African American.

The CMDITR has developed strong collaborative relationships with several units and organizations at partner institutions that serve underrepresented groups. In the past year the Center has worked with the following organizations:

- The McNair Achievement Program (graduate school preparatory program for low-income first generation college students)
- Minority Access to Research Careers (MARC)
- Minority Health Disparities Research Opportunities (MHD)
- Summer Research Institute (SRI) for Under-represented Groups
- The Alfred P. Sloan Foundation for Native Americans
- Collaborative Experiences in the Chemical Sciences (CRCS)

Through the Center's work with these organizations, we will continue to leverage resources and funds to organize professional development and recruitment events, seminars, and workshops for individuals from underrepresented groups. This has proved highly effective for recruitment into the Center's graduate programs and summer undergraduate research programs.

At the partner institutions, additional resources at the undergraduate level are being leveraged by using campus support programs such as Georgia Tech's FOCUS Program, Office of Minority Development, UA's Diversity Resource Office, and UW's Office of Minority Affairs.

#### REU Program and Diversity

The HoP REU program is a major contributor to the Center's goal of developing a diverse, competitive, and globally-engaged science and engineering workforce. The Center seeks to draw on the integration of research and education to attract a diverse pool of talented students into careers in science and engineering. REU programs have been shown to encourage the pursuit of graduate education in science and engineering by underrepresented students, and CMDITR recognizes that this strategy is instrumental to diversity enhancement of the technology workforce. As a result, CMDITR will provide Gateway and Capstone research experiences to approximately 24 students this summer through its Hooked-on-Photonics (HoP) REU program. This program is described in III.4.a.

Interest in HoP continues to be strong. We received 153 applications for the 2006 program. Projected participation (at the time of this report) suggests strong representation by women and minority students (15 interns expected to be female (62.5%); overall minority participation projected at 9 (37.5%) (2 male + 7 female). Proportional participation by students from underrepresented groups was similar in 2005. Furthermore, we expect that 14 of 24 participants (58%) will be "*gateway students*".

The Center will continue its strong ties with NSU again in Summer 2006 by having two NSU students participate at GT and UW. Because of the REU collaborative exchange program last year, NSU and the CMDITR forged stronger relationships across the board in research, education, and diversity enhancement.

The REU program offers activities that have a direct impact on minority student retention and enrollment in advanced degree programs. Specifically, REU students were exposed to mentors and minority role models in science and engineering and educated about graduate school opportunities through numerous activities designed to enhance their potential. The participation of REU women and minority candidates is encouraging given the strong positive correlation between participation in REU programs and student enrollment in advanced degree programs. There is also an increased likelihood that underrepresented students that participate will enroll and succeed in graduate programs and pursue postdoctoral assignments.

Beyond funding of the GEM fellowship, CMDITR has committed \$110,000 annually in its budget for funding of graduate students and postdocs from underrepresented groups. This funding may help provide follow-up support for GEM fellows beyond their first year. It also assists faculty by providing support to exceptional students who are not already supported by STC dollars.

Since the inception of the Center, research funds received from NSF have largely been disbursed annually among some 30-40 PIs, and the bulk of these funds were used to fund graduate students and postdoctoral fellows (i.e. 43-44% of total NSF award in years 3 and 4). CMDITR faculty advisors are urged to allocate these funds to support individuals from

underrepresented groups whenever possible to help realize our goal of increasing the diversity of the science and engineering worker and leadership pipeline.

## **5. FUTURE PLANS TO ENHANCE DIVERSITY**

American society is increasingly diverse. The CMDITR is committed to strengthening its diversity initiatives to develop and nurture future leaders in the science and engineering workforce who reflect the diversity in both gender and ethnicity of our society. The Center's initiatives for diversity are highly coordinated and strategically directed at all levels both within the Center and among its constituents. CMDITR is committed to the continued development and sustainability of key partnerships along with tactical programs and systems related to attracting, retaining, and promoting a diverse informational technological workforce pipeline. With these ambitious goals, the CMDITR is committed to providing the necessary resources for achieving both near-term and long-term (sustainable) success in diversity. The CMDITR diversity enhancement plan is a long-term strategy that is integrative and systematic. Looking forward, we envision the following key components:

(1) continued active recruitment of minority personnel (students, postdoctoral fellows, faculty, advisory board members and staff); (2) a center-wide mentoring program (3) center-wide professional development for graduate students and postdoctoral students; (4) REU internships; (5) CMDITR graduate and postdoctoral fellowships; (6) GEM Fellowships; (7) active partnerships with Norfolk State University and other minority-serving institutions; and (8) outreach activities which project a more positive image of science, engineering and technology careers to underrepresented groups in K-12 and in universities.

The CMDITR is committed to strengthening programs that raise the profile of STCs among minority professional societies and institutions. Our collaborative research and educational effort with Norfolk State University serves as a very important model for future partnerships with minority serving institutions. As a result of this relationship, similar initiatives have begun with Jackson State University and Alabama A&M.

CMDITR will continue to develop and align its center-wide diversity plan to meet the needs of the Center and its constituents. Resources will be efficiently utilized to enhance diversity enhancement activities with targeted minority-rich institutions and organizations.

The CMDITR will also continue to grow and expand its programs and partnerships with existing diversity programs at CMDITR institutions. For example, at the Georgia Institute of Technology, the Faculty FOCUS on Chemistry program, through the leveraging of resources with other institutional diversity programs, will continue to grow and expand. Similarly, at the University of Washington, the Center has partnered with the other diversity programs on campus and the UW administration to better coordinate graduate recruitment through a new full-time recruiter position funded by multiple centers and departments.

The CMDITR's initial efforts to market the GEM-STC Partnership greatly enhanced this program's success. The CMDITR will continue to spearhead this multi-STC partnership with GEM to place minority students in science and engineering graduate programs. Because STC faculty have access to the new GEM-STC website and the GEM database of 700+ minority applicants in science, engineering, and math; recruitment and placement of students in CMDITR institutions should continue to increase. In the next phase of website development, the

CMDITR will work with GEM to help enhance their database so that students can be matched (via email) directly with faculty members who have relevant research interests.

The CMDITR is committed to the development of an REU student tracking system to collect data regarding the career choices and next steps for our REU alumni. This follow-up measure is extremely important because CMDITR faculty can provide resources and information to underrepresented REU alumni that can have a direct impact on their retention and their enrollment in advanced degree programs.

To assist with REU recruitment and outreach efforts, we are looking into the feasibility of producing a "Careers in Photonics" videoclip. Such a marketing tool would be used in high school and college settings by introducing underrepresented minority students to possible career options in photonics early-on in their educational paths.

The CMDITR has taken initial steps for the design and implementation of several key diversity enhancing programs to be implemented in the coming year. For example, the Center will implement center-wide mentoring and professional development programs. Also, at the time of writing of this report, Drs. Marder and Oden are in discussions with Michele Lezama, GEM Executive Director, regarding creation of a GEM Postdoctoral Fellowship Program. While the model is not yet fully defined, the goals are to create a highly selective program to provide recent GEM Ph.Ds with an excellent research experience, but also extensive mentoring in preparation for becoming faculty members. One possibility will be to create opportunities for GEM Postdoctoral Fellows to co-teach classes with experienced faculty. The idea behind the program is to better prepare prospective new faculty for the interview process as well as the environment they will encounter if they assume a professorship. Our hypothesis is that by providing such training, we can help to increase the numbers of minority candidates choosing a career in the academy.

The CMDITR is committed to designing and implementing strategies and programs that encourage and provide resources for minority students and women to successfully complete for advanced degrees in engineering and science. The CMDITR's mission is to facilitate greater diversity in the nation through multiple strategic initiatives.

## **6. SUMMARY TABLE OF DIVERSITY ENHANCING ACTIVITIES**

**Primary Person Involved:** Keith L Oden

**Other People Involved:** Seth Marder, Jean-Luc Bredas, Joe Perry, Olanda Bryant

**Activity Title:** Faculty FOCUS on Chemistry Program

**Description:** With leveraged resources between CMDITR and GT, this recruitment program brought 10 HBCU Chemistry faculty and 30 minority STEM students (undergraduate Chemistry majors) to GT for a recruitment visitation program. The mission of this program was to build linkages and relationship between GT, CMDITR and HBCUs, and to facilitate HBCU students applying to CMDITR schools for graduate school and participating in summer REU programs. Additional, emphasis was also placed on developing research collaborations between HBCU researchers and CMDITR researchers. Faculty from the following schools participated; Spelman, Morehouse, Grambling, FAMU, Hampton, NC A&T, Texas Southern, Howard, Tuskegee, Jackson State University and Albany State University.

**Date:** January 12-15, 2006

**Audience Description:** 300 minority STEM undergraduate and graduate students

**Approx. Number of Attendees:** 30 minority STEM Students and 10 HBCU faculty

**Primary Person Involved:** Keith L Oden

**Activity Title:** HBCU-UP National Conference/Baltimore, MD

**Description:** Hosted STC Career booth and spoke to 300 students regarding STC opportunities such as REUs, fellowships and graduate school enrollment. The National Science Foundation's annual HBCU-UP Conference is a showcase for the research activities of students attending minority institutions majoring in science, technology, engineering, and mathematics (STEM). This is the only conference that gives a true view of the similarities and differences that are characteristics of the students in the STEM departments at the HBCU-UP institutions. This event provided an opportunity for STEM students to display their work and to investigate graduate school and career options.

**Date:** March 9-11, 2006

**Audience Description:** minority STEM Students and HBCU College faculty

**Approx. Number of Attendees:** 300 minority STEM Students and 20 HBCU faculty

**Primary Person Involved:** Suely M Black

**Other People Involved:** Simon Jones, Sam Sun

**Activity Title:** Offering of Team-Taught Course at NSU, 2005 & 2006

**Description:** Faculty from NSU, UW, UA and GT delivered lectures at NSU or by videoconference in the Spring of 2005 and 2006. The course provided supplementary material to the current M.S. in Materials Science course offerings. The students' feedback was very positive.

**Date:** March, April, May, 2005 and 2006

**Audience Description:** M.S. in Materials Science students at NSU, 80%+ African-American

**Approx. Number of Attendees:** 16

**Primary Person Involved:** Keith L Oden

**Activity Title:** SACNAS National Conference/Denver

**Description:** Hosted conference booth and shared information with students regarding opportunities within the STCs and CMDITR. Also, spoke with Hispanic and minority faculty; and faculty from minority serving institutions regarding developing mutually beneficial relationships for student referrals and collaborative research. The mission of the Society for Advancement of Chicanos and Native Americans in Science (SACNAS) is to encourage Chicano/Latino and Native American students to pursue graduate education and obtain the advanced degrees necessary for science research, leadership, and teaching careers at all levels.

**Date:** September 29-October 2, 2005

**Audience Description:** STEM students of Hispanic, Chicano, and Native American Indian descent

**Approx. Number of Attendees:** 1000

**Primary Person Involved:** Peter Delfyett

**Activity Title:** Course Taught

**Description:** Intro to the Engineering Profession (this is taught to incoming minority freshmen in all areas of engineering (27 students registered) during the summer prior to their entering in the fall semester.

**Date:** Summer 2005

**Audience Description:** Undergraduate Freshmen

**Approx. Number of Attendees:** 27

**Primary Person Involved:** Larry Dalton

**Other People Involved:** Drs. Suely Black, Sam Sun, and Simon Jones

**Activity Title:** Taught 2 lectures for CMDITR-NSU mini-course entitled

**Description:** This mini-course was designed to test critical core materials for the planned NSU Ph.D. program. It focused on both fundamentals and state-of-the-art advanced materials for optoelectronic applications.

**Date:** February-May 2005

**Audience Description:** Graduate students, mostly from under-represented groups

**Approx. Number of Attendees:** 15

**Primary Person Involved:** Keith L Oden

**Other People Involved:** Olanda Bryant

**Activity Title:** 2005 Southeast NOBCCHE Regional Meeting ("Transboundary Navigation in the Global Economy")

**Description:** Meeting Highlights: Technical and chapter activity poster presentations; reception; dynamic career perspective, oral technical presentations; global economy career panel discussion, career and professional development workshops; chapter development strategies and networking.

**Date:** November 4 - 5, 2005

**Audience Description:** Minority Undergraduate Students, Graduate Students, Faculty, Post Docs, & Industry

**Approx. Number of Attendees:** 90 participants

**Primary Person Involved:** Peter Delfyett

**Other People Involved:** National Society of Black Physicists (NSBP)

**Activity Title:** Key Note Dinner Presentation

**Description:** Key Note Dinner Presentation at the National Society of Black Physicists Annual Meeting.

**Date:** Feb 2005

**Audience Description:** Members of NSBP

**Approx. Number of Attendees:** 500

**Primary Person Involved:** Keith L Oden

**Activity Title:** ADVANCE Reception

**Description:** Attended a welcoming reception sponsored by GT's ADVANCE Program and the GT Center for the Study of Women, Science, and Technology. Spoke with STEM students and faculty regarding opportunities within CMDITR.

**Date:** September 14, 2005

**Audience Description:** students and faculty

**Approx. Number of Attendees:** 60

**Primary Person Involved:** Chris DeRose

**Other People Involved:** Nasser Peyghambarian, Ann Mescher, Neal Armstrong

**Activity Title:** Hands on Future Tech

**Description:** Hands-on demonstrations detailing how CMDITR technology such as electro-optic modulators work were provided. Career information on graduate school, REU programs and postdoctorate opportunities was presented.

**Date:** September, 16 2005

**Audience Description:** Minority High School Students

**Approx. Number of Attendees:** 100

**Primary Person Involved:** Roderick Jackson

**Activity Title:** FIRST Robotics Mentor

**Description:** Provided engineering support to Southside Comprehensive High School in Atlanta, GA for their FIRST (For Inspiration and Recognition of Science and Technology) Robotics Competition.

**Date:** 02/15/2006-3/18/2006

**Audience Description:** Minority High School Students

**Approx. Number of Attendees:** 10 students

**Primary Person Involved:** Bernard Kippelen

**Activity Title:** Invited lecturer at international summer school

**Description:** Soft Matter: Nanoscience and Photonics, Science and Technology, ALARICO (International Center for Technology and Innovation), Cosenza, Calabria, Italy

**Date:** 5/16/05 - 5/20/05

**Audience Description:** students from various countries (predominantly from Africa) with an emphasis on developing countries

**Approx. Number of Attendees:** 50

**Primary Person Involved:** Seth Marder

**Activity Title:** Panel Member for ADVANCE

**Description:** ADVANCE workshop on proposal development. Provided guidance on how to compete for funding, get involved in centers, component on how to put centers together. Follow-up meeting on February 27 with Jennifer Clark, Asst. Prof. of Public Policy.

**Date:** February 9, 2006

**Audience Description:** Faculty

**Approx. Number of Attendees:** 5

**Primary Person Involved:** Seth Marder

**Activity Title:** National Consortium for Graduate Degrees for Minorities in Engineering and Science, Inc.

**Description:** Presentation on the GEM-STC partnership and the research opportunities of Science and Technology Centers in general.

**Date:** 06/30/05

**Audience Description:** Graduate Students

**Approx. Number of Attendees:** 60

**Primary Person Involved:** Seth Marder

**Other People Involved:** Keith Oden

**Activity Title:** Black History Month Celebration

**Description:** Discussant at the Panel Discussion entitled "The Future of Blacks in Science and Engineering", presented by the Ivan Allen College at GT.

**Date:** February 6, 2006

**Audience Description:** Professors, Postdocs, Graduate and Undergraduate students, fellowship sponsors and administrators.

**Approx. Number of Attendees:** 30

**Primary Person Involved:** Rachel Morgan Theall

**Activity Title:** MESA tour of UA campus

**Description:** Students from the Mathematics, Engineering, Science, Achievement (MESA) club at Desert View High School visited chemistry labs, neuroscience labs, and the National Optical Astronomy Observatory. Students had lunch with Humberto Gherna, a former REU student and asked him questions about college life.

**Date:** October 20, 2005

**Audience Description:** Hispanic High School Students

**Approx. Number of Attendees:** 15

**Primary Person Involved:** Andrea Munro

**Other People Involved:** Ethan Allen

**Activity Title:** Science for Success

**Description:** Designed a module for high school students about photoluminescent nanocrystals during a one week program.

**Date:** July 2005

**Audience Description:** Underrepresented minority high school students

**Approx. Number of Attendees:** 15