Annual Report

2014

Life Sciences Education and Research

MichiganTech

The Biotechnology Research Center in 2014

The mission of the Biotechnology Research Center (BRC) is to promote education and research in the areas of molecular biology, biochemistry, genetics, genomics, bioinformatics and biotechnology for the benefit of society and the environment. The major focus is on fostering interdisciplinary research at MTU and being recognized for research excellence, dissemination of knowledge, and commitment to quality education in the life sciences. Three main activities of the BRC are fostering collaborative research in biotechnology, helping to provide state-of-the-art research facilities in which to conduct research, and contributing to educational opportunities in biotechnology.

The Biotechnology Research Center continues to attract faculty from a range of disciplines varying from chemical engineering to kinesiology & integrative physiology as evidenced by the addition of five new members in 2014 (Aparna Deshpande, Xuan Liu, Zhiying Shan, Marina Tanasova, Yordan Yordanov, Ye Sun, and Ebenezer Tumban). We welcome these new members, most of whom are beginning their careers as assistant professors at MTU, into our Center and look forward to many new ideas and innovations from them. Our Center continues the tradition of excellence in research, student training and outreach for the benefit of society and the environment with over $12.3 million in 55 research grants and contracts with the major portion coming from the primary national funding agencies. Through the collective efforts from the members and the renewed focus on securing large research funding, BRC has experienced the largest new research awards of $4.6 million in 2014, which is twice the number in 2013. The increased in new research awards will lead to increased research expenditure in following years.

The diversity of our research interests is reflected in the range of funding agencies including the National Science Foundation, National Institutes of Health, the United States Department of Agriculture, US Department of Energy, and the US Department of Education. This diversity is also reflected in the titles of the 87 research publications in 2014. Also, in 2014, the BRC has supported research infrastructure at MTU with expenditures of over $15,500 to purchase instrumentation valued at more $222,115. These funds have been primarily used by junior faculty to supplement start-up allocations. We have supported our 77 graduate students, 15 postdoctoral researchers/research scientists and 82 undergraduate students with travel awards, fellowships, and cash awards and prizes for outstanding presentations at our annual biotech exposition. Also, as part of our outreach activities this year, BRC also partially funds for the BRC seminar series. Infrastructure development and student training are core activities that exemplify our conviction to directly and effectively support life sciences research at Michigan Technological University.

BRC 2014 at a Glance

49 Faculty members
64 Ph.D. students
85 Undergraduate students
28 SURF and Other Awards
49 Active research projects
$12,349,246 Total Research Funding
15 Research scientists/associates
20 M.S. students
14 Summer Internships
91 Peer-reviewed publications
$4,658,240 in new research awards
$2,117,627 Research Expenditures

Current BRC Support Team

Director
Keat Ghee Ong

Staff Assistant
Mary Tassava

Executive Committee
Victor Busov (SFRES*)
Jason Carter (CSA)
Jeremy Goldman (COE)

Travel Grant Committee
Oliver Gailing, Chair (SFRES)
Feng Zhao (COE)
Lanrong Bi (CSA)

Seminar Committee
Ashutosh Tiwair, Chair (CSA)
David Shonnard (COE)
Hairong Wei (SFRES)
Leah Vucetich (SFRES)

* COE: College of Engineering; CSA: College of Science and Arts; SFRES: School of Forest Resources and Environmental Science

BRC Membership

Seven new members joined the Biotechnology Research Center in 2014 which include Aparna Deshpande, (Research Assistant Professor, Biological Sciences), Xuan Liu (Assistant Professor, Biomedical Engineering), Zhiying Shan (Assistant Professor, Kinesiology and Integrative Physiology), Ye Sun (Assistant Professor, MEEM), Marina Tanasova (Assistant Professor, Chemistry), Ebenezer Tumban (Assistant Professor, Biological Science) and Yordan Yordanov (Research Assistant Professor, School of Forest Resources and Environmental Science). MTU departments represented include Biological Sciences, Biomedical Engineering, Physics, Mechanical Engineering–Engineering Mechanics, School of Forest Resources and Environmental Sciences, Mathematics, Chemistry, Chemical Engineering, Kinesiology & Integrative Physiology, and Material Sciences and Engineering. The BRC currently has 49 faculty members including three department chairs and one associate dean. BRC member, Xuan Liu, left the university in academic year 2014. Several faculty members were honored with election/appointment to posts in national/international level science organizations. Our students were very successful at acquiring grants, fellowships and other honors based on their research productivity.

Current BRC Faculty Members

Susan Bagley	Professor Emeritus, Biological Sciences
Lanrong Bi	Associate Professor, Chemistry
Victor Busov	Professor, SFRES
Jason Carter	Department Chair, Associate Dean, Associate Professor, KIT
Qing-Hui Chen	Assistant Professor, KIT
Tarun Dam	Assistant Professor, Chemistry
Rupali Datta	Associate Professor, Biological Sciences
Aparna Deshpande	Research Assistant Professor, Biological Sciences
John Durocher	Assistant Professor Biological Sciences
Shiyue Fang	Associate Professor, Chemistry
Megan Frost	Associate Professor, Biomedical Engineering
Oliver Gailing	Associate Professor, SFRES
Jeremy Goldman	Associate Professor, Biomedical Engineering
Michael Gretz	Professor, Biological Sciences
Patricia Heiden	Professor, Chemistry
Caryn Heldt	Assistant Professor, Chemical Engineering
Jingfeng Jiang	Assistant Professor, Biomedical Engineering

Chandrashekhar Joshi	Department Chair, Biological Sciences; Professor, SFRES
Sean Kirkpatrick	Chair and Professor, Biomedical Engineering
Bruce Lee	Assistant Professor, Biomedical Engineering
Wenzhen Li	Associate Professor, Chemical Engineering
Haiying Liu	Professor, Chemistry
Lynn Mazzoleni	Assistant Professor, Chemistry
Adrienne Minerick	Associate Professor, Chemical Engineering
Pushpalatha Murthy	Professor, Chemistry
Keat Ghee Ong	BRC Director, Associate Professor, Biomedical Eng.
Ching-An Peng	Professor/Mack Chair, Chemical Engineering Rupak
Rajachar	Senior Lecturer, Biomedical Engineering
Paul Sanders	Assistant Professor, Materials Science & Engineering
Qiuying Sha	Associate Professor, Mathematical Sciences
Reza Shahbazian-Yassar	Associate Professor, ME-EM
Zhiying Shan	Assistant Professor, KIT
Tolou Shokuhfar	Assistant Professor, ME-EM
David Shonnard	Robbins Professor, Chemical Engineering
Ye Sun	Assistant Professor, ME-EM
Marina Tanasova	Assistant Professor, Chemistry
Guiliang Tang	Associate Professor, Biological Sciences
Xiaoqing Tang	Assistant Professor, Biological Sciences
Martin Thompson	Associate Professor, Chemistry
Ashutosh Tiwari	Assistant Professor, Chemistry
Ebenezer Tumban	Assistant Professor, Biological Science
Leah Vucetich	Research Assistant Professor, SFRES
Hairong Wei	Assistant Professor, SFRES
Thomas Werner	Assistant Professor, Biological Sciences
Ramakrishna Wusirika	Associate Professor, Biological Sciences
Yordan Yordanov	Research Assistant Professor, SFRES
Yinan Yuan	Research Assistant Professor, SFRES
Shuanglin Zhang	Professor, Mathematical Sciences
Feng Zhao	Assistant Professor, Biomedical Engineering
Wen Zhou	Assistant Professor, Chemical Engineering

Research Scientists/Associates

1. Dr. Bin Cao, Postdoctoral Researcher (Fang)
2. Dr. Madmumita Dash, Postdoctoral Researcher (Busov)
3. Dr. Xiaochu Ding, Postdoctoral Researcher (Lee)
4. Dr. Tatyana Georgieva, Postdoctoral Researcher (Busov)
5. Mingjun Gu, Research Associate (Chen)
6. Dr. Jagadeesh Janjanam, Postdoctoral Researcher (Tiwari)
7. Meng-Hsien Lin, Research Scientist (Lee)
8. Dr. Swati Puranik, Postdoctoral Research Scientist (Gailing/Joshi)
9. Dr. Giri K. Vegesna, Postdoctoral Researcher (Lee)
10. Dr. Qi Xing, Postdoctoral Researcher (Zhao)
11. Dr. Elena Yordanova Postdoctoral Researcher (Busov)
12. Dr. Yordan Yordanov, Research Assistant Professor (Busov)
13. Dr. Lijun Zhang, Postdoctoral Researcher (Zhao)
14. Ruhua Zhang, Visiting Scientist (Gailing)
15. Yu Zhao, Research Associate (Zhao)

Graduate Students

Biological Sciences

1. Faten Dhawi (Ph.D., Datta/Wusirika)
2. Kyle Driscoll (M.S., Deshpande/Wusirika)
3. Emily Geiger (Ph.D., Datta)
4. Morton Harwood (Ph.D., Durocher)
5. Andrew Kennedy (M.S., Datta)
6. Jeffrey Kiiskila (Ph.D., Datta)
7. Kavitha Kumar (Ph.D., Joshi)
8. Chelsea Mitchell (M.S., Werner)
9. Nafeesa Rahman (M.S., Deshpande/Wusirika)
10. Komal Kumar Bollepogu Raja (Ph.D., Werner)
11. Ramana Reddy (Ph.D., Datta)
12. Aparupa Sengupta (Ph.D., Datta)

Biomedical Engineering

13. Brett Barker (M.S., Jiang)
14. Weilue He (Ph.D., Frost)
15. Sean Hopkins (Ph.D., Frost)
16. Baratwaaj Kannan (M.S., Zhao)
17. Elizabeth Kruppe (M.S., Frost/Zhao)
18. Yuting Li (M.S., Lee)
19. Yuan Liu (Ph.D., Lee)
20. Connor McCarthy (Ph.D., Frost/Goldman)
21. Heo Meng (Ph.D., Lee)
22. Ameya Narkar (M.S., Lee)
23. Julie Osborne (M.S., Frost)
24. Rattapol Pinnaratip (Ph.D., Lee/Rajachar)
25. Zichen Qian (Ph.D., Zhao)
26. Emily Shearier (Ph.D., Zhao)
27. Kevin Sunderland (Ph.D., Jiang)
28. Yu Wang (Ph.D., Jiang)
29. Andrew DeRouin (Ph.D., Ong)
30. Sterling Prince (Ph.D., Ong)
31. Brandon Pereles (Ph.D., Ong)
32. Joseph Smith (M.S., Ong)

Chemical Engineering

33. Tayloria Adams (Ph.D., Minerick)
34. Zainab Alshoug (Ph.D., Minerick)
35. Ran An (Ph.D., Minerick)
36. Jeana Collins (Ph.D., Minerick)
37. Maria Gencoglu (Ph.D., Heldt)
38. Maryam Khaksari (Ph.D., Minerick
39. Hwi Yong Lee (Ph.D., Minerick)
40. Ashish Saksule (Ph.D., Heldt)
41. K. Saagar Vijayaragavan (Ph.D., Heldt)

42. Zhichao Wang (Ph.D., Minerick)
43. Hongyu Xie (M.S., Minerick)
44. Chungja Yang (Ph.D., Minerick)

Chemistry

45. Rashmi Adhikari (Ph.D., Tiwari)
46. Soha Albukhari (Ph.D., Heiden)
47. Jiangheng Bi (Ph.D., Liu H)
48. Robert Brown (M.S., Dam)
49. Nethaniah Dorh (Ph.D., Tiwari)
50. Colina Dutta (Ph.D., Tiwari)
51. Ni Fan (Ph.D., Dam)
52. Suntara Fueangfung (Ph.D., Fang)
53. Bhaskar Halami (Ph.D., Liu H)
54. John Hausman (M.S., Tiwari)
55. Ashok Khanal (Ph.D., Fang)
56. Cong Li (M.S., Liu H)
57. Xi Lin (Ph.D., Fang)
58. Wafa Mazi (Ph.D., Liu H)
59. Andrew Perla (M.S., Tanasova)
60. Durga Pokharel (Ph.D., Fang)
61. Shahien Shahsavari (Ph.D., Fang)
62. Melanie Talaga (Ph.D., Dam)
63. Giri Vegesna (Ph.D., Liu H)
64. Xu Xiang (Ph.D., Heiden)
65. Fei Xie (Ph.D., Liu)
66. Mu Yang (Ph.D., Tiwari)
67. Jingtuo Zhang (Ph.D., Liu H)

Forest Resources and Environmental Sciences

68. Roba Bdeir (Ph.D., Gailing)
69. Kristina Flesher (M.S., Gailing)
70. Sirkorn Khumwan (Ph.D., Gailing)
71. Sudhir Khodwekar (Ph.D., Gailing)
72. Jennifer Lind (Ph.D., Gailing)
73. Sandra Owusu (Ph.D., Gailing)
74. Justin Segula (Ph.D., Busov)

Kinesiology & Integrative Physiology

75. Andrew Chapp (Ph.D., Chen)
76. Ida Fonkoue (Ph.D., Carter)
77. Michael Huber (M.S., Chen)
78. Robert Larson (Ph.D., Chen)

Mathematical Sciences

79. Xueling Li (M.S., Sha)
80. Xiaoyu Liang (Ph.D., Zhang)
81. Zhenchuan Wang (Ph.D., Zhang)

82. Xinlan Yang (Ph.D., Sha)
83. Huanhuan Zhu (Ph.D., Sha)

Mechanical Engineering

84. Dave Joda (M.S., Jiang)

Undergraduate Students

1. Jonathon Anderson, Chemical Engineering (Lee)
2. Evan Bachman, Biological Sciences (Werner)
3. Carl Baker, Chemical Engineering (Minerick)
4. Cedrick Barber, Chemical Engineering (Minerick)
5. Alexander Benson, Biomedical Engineering (Frost)
6. Ryan Bensen, Biological Sciences (Werner)
7. Michael Bostwick, Biomedical Engineering (Lee)
8. Bruce Bunson, Biomedical Engineering (Frost)
9. Morgan Cencer, Chemistry (Lee)
10. Emily Collins, Forest Resources & Environmental Sciences (Gailing)
11. Michael D'Angelo, Chemical Engineering (Heldt)
12. Abby DeWitt, Kinesiology & Integrative Physiology (Carter)
13. Ryan Dixon, Biological Sciences (Durocher)
14. Luke Doskey, Chemistry (Dam)
15. Zach Eckert, Chemical Engineering (Minerick)
16. Corey Ernst, Biomedical Engineering (Lee)
17. Corey Fase, Biomedical Engineering (Zhao)
18. Madeline Faust, Biomedical Engineering (Lee)
19. Joseph Feddie, Chemistry (Heiden)
20. Kemin Fena, Biomedical Engineering (Zhao)
21. Evan Fernandez, Biological Sciences (Wusirika)
22. Kailey Feuerstein, Biological Sciences (Datta)
23. Kristin Flickinger, Biomedical Engineering (Jiang)
24. Amani Gillete, Biomedical Engineering (Goldman)
25. Kate Gladowski, Kinesiology & Integrative Physiology (Carter)
26. Nathanael Green, Chemistry (Fang/Yuan)
27. Ian Greenlund, Biological Sciences (Werner)
28. Michael Grillo, Chemical Engineering (Heldt)
29. Roger Guillory, Biomedical Engineering (Goldman)
30. Taija Hahka, Biological Sciences (Datta)
31. Sarah Harttung, Forest Resources & Environmental Sciences (Gailing)
32. Rebecca Hobmeyer, Biological Sciences (Werner)
33. Rachael Huempfner, Environmental Engineering (Datta)
34. Olivia Ingram, Biological Sciences (Werner)
35. Jonathan Jaehnig, Scientific and Technical Communication (Frost)
36. Kyle Jansen, Biomedical Engineering (Zhao)
37. Tyler Jensen, Chemical Engineering (Heldt)
38. Emil Johnson, Biomedical Engineering (Zhao)
39. Nick Jones, Biomedical Engineering (Jiang)
40. Mark Keranen, Biological Sciences (Werner)
41. Thomas Kivisto, Biomedical Engineering (Jiang)

42. Benjamin Klimczyk, Biological Sciences (Datta)
43. Shari Konst, Chemistry (Lee)
44. Joseph Kristofik, Biomedical Engineering (Jiang)
45. Lucia Li, Chemical Engineering (Fang)
46. Sean LeRolland-Wagner, Chemistry (Fang)
47. Laura Lynch, Biomedical Engineering (Goldman)
48. Kelsey Maijala, Chemical Engineering (Minerick)
49. Hannah Marti, Biomedical Engineering (Durocher)
50. Katherine Massa, Chemical Engineering (Minerick)
51. Abigail Meisel, Biological Sciences (Werner)
52. Ross Michales, Biomedical Engineering (Jiang)
53. Meridith Murley, Biomedical Engineering (Lee)
54. Eliot Nagler, Chemical Engineering (Minerick)
55. Abigail Nieskes, Biomedical Engineering (Jiang)
56. Peter Nouhan, Biological Sciences (Werner)
57. Austin O'Dea, Chemsitry (Tanasova)
58. Connor Olds, Chemisty (Liu H)
59. Nina Pacella, Biomedical Engineering (Ong)
60. Amber Peabody, Biological Sciences (Werner)
61. Eric Pearson, Chemical Engineering (Heldt)
62. Jared Pecore, Biological Sciences (Chen)
63. Amber Ranski, Biological Sciences (Datta)
64. Bridgett Rebbeck, Biological Sciences (Werner)
65. Travis Redman, Biomedical Engineering (Zhao)
66. Cal Rittual, Biomedical Engineering (Jiang)
67. David Rosen, Biomedical Engineering/Kinesiology & Integrative Physiology (Jiang)
68. David Schreifels, Cognitive & Learning Sciences (Chen)
69. Ashley Schuman, Chemistry (Fang)
70. Alyssa Sipes, Biological Sciences (Datta)
71. Sarah Skelton, Biomedical Engineering (Lee)
72. Hugh Stanton, Biomedical Engineering (Zhao)
73. Rachel Stites, Biomedical Engineering (Zhao)
74. Mitchell Tahtinen, Biomedical Engineering (Zhao)
75. Caleb Vogt, Biomedical Engineering (Zhao)
76. Travis Wakeham, Biological Sciences (Datta/Durocher)
77. Anna Waller, Biomedical Engineering (Goldman)
78. Randall Wilharm, Chemistry (Lee)
79. Anna-Catharina Wilhelm, Chemistry (Fang/Lee)
80. Audra Winter, Chemistry (Lee)
81. Pennie Winters, Chemical Engineering (Minerick/Heldt)
82. Randee Wlodek, Biological Sciences (Datta)
83. Keegan Yates, Biomedical Engineering (Zhao)
84. Eponine Zenker, Chemistry (Tiwari)
85. Carson Zois, Biological Sciences (Jiang)

BRC Faculty Members Special Honors

John Durocher: Certificate of Appreciation of Outstanding Contributions as a Faculty Member, Greek Life at Michigan Tech

Qiuying Sha: Outstanding Teaching Award 2014, Department of Mathematical Sciences at Michigan Technological University
Outstanding Faculty Research Award 2014, Department of Mathematical Sciences at Michigan Technological University

Jason Carter: President, Michigan Physiological Society (4/14 – 4/15)
Board of Directors, American Kinesiology Association (1/12 – 12/14)
Cross-Sectional Symposium Chair for Experimental Biology 2014 (San Diego, CA)

Outreach/Summer Internships (15)

1. **Anaflavia Alemendras-Reyes**, Grand Rapids Community College (Zhao)
2. **Umang Arora**, Indian Institute of Technology at Kanpur, India (Heiden)
3. **Rolando Bacanegra**, MICUP, Grand Rapids Community College (Heldt)
4. **Binu Baral**, MICUP, Grand Rapids Community College (Heldt)
5. **Vagarshak Begoyan**, University of California-Davis (Tanasova)
6. **Phoebe Hu,** Houghton High School (Frost)
7. **Pursu Neopaney**, Grand Rapids Community College (Zhao)
8. **Hien Nguyen**, MICUP, Grand Rapids Community College (Minerick)
9. **Tracy Ross**, MICUP, Wayne County Community College (Lee)
10. **Tapee Saowalakkul**, Kasetsart University, Thailand (Heldt)
11. **Anne Shoos,** University of Michigan (Frost)
12. **Matt Strong**, Finlandia University (Fang)
13. **SyQuan Tran**, Grand Rapids Community College (Zhao)
14. **Chinyelu Umeokolo,** Wayne County Community College (Fang)
15. **Dr. A. Venu Vinod**, Visiting Professor (Minerick);
    Assoc. Prof/Assoc. Dean, Nat'l Institute of Technology, India

SURF Awards

Kristin Flickinger (Biomedical Engineering), Advisor: Jingfeng Jiang
Sarah Harttung (Forest Resources & Environmental Sciences), Advisor: Oliver Gailing
Peter Gardner (Chemical Engineering), Advisor: Heldt
Mark Keranen (Biological Sciences), Advisor: Thomas Werner
Meridith Murley (Biomedical Engineering), Advisor: Bruce Lee
David Rosen (Biomedical Engineering/Kinesiology & Integrative Physiology), Advisor: J. Jiang
Eponine Zenker (Chemistry), Advisor: Ashutosh Tiwari

Student Honors Received

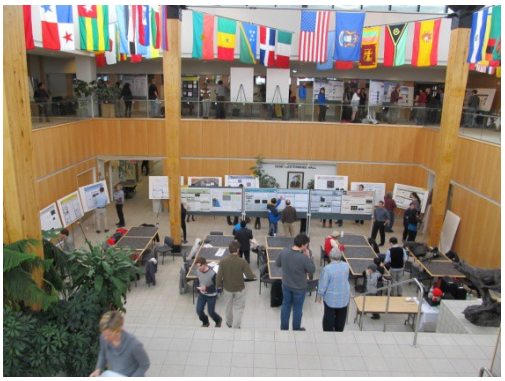
Jonathon Anderson: Third Place in MTU Undergraduate Research Expo
Michael Bostwick: Undergraduate Merit Award at MTU BRC Student Research Forum
Morgan Cencer: Second Place in MTU Undergraduate Research Expo
Andrew Chapp: Selected Oral Presentation Award at 1st Annual Meeting of Michigan Physiology Society
Jeana Dillon: First Place in Chemical Engineering Research Symposia at MTU
Nethaniah Dorh: FASEB MARC Travel Award for Annual Symposium of the Protein Society
Suntara Fueangfung: First Place for poster presentation at ACS Upper Peninsula Student Research Symposium at NMU, Spring Semester Graduate School Doctoral Finishing Fellowship
Maria Gencoglu: First Place in Chemical Engineering Research Symposia at MTU
Nathanael Green: Undergraduate Award in Organic Chemistry by ACS's Division of Organic Chemistry
Maryam Khaksari: Society of applied Spectroscopy (SAS) Early Career Researcher Award
Maryam Khaksari: Highest award at Graduate Research Colloquium at MTU
Ashok Khanal: First Place for poster presentation at ACS Upper Peninsula Student Research Symposium at NMU
Robert Larson: Research Recognition Van Harreveld Award at Experimental Biology Annual Meeting, APS, CNS Section
Yuting Li: Kenneth L. Stevenson Biomedical Engineering Summer Research Fellowship
Ameya Narkar: Kenneth L. Stevenson Biomedical Engineering Summer Research Fellowship
Durga Pokharel: MTU Bhakta Rath Research Award, Department of Chemistry Outstanding Graduate Student Award
Mitchell Tahtinen: Kenneth L. Stevenson Biomedical Engineering Summer Research Fellowship
Melanie Talaga: First Place for poster at American Chemical Society Regional Meeting
Dylan Turpinen: Gary and Judy Anderson Fellowship
K. Saagar Vijayaragavan: Graduate Government Service Award
Anna-Catharina Wilhelm: Sandretto Undergraduate Summer Research Fellowship

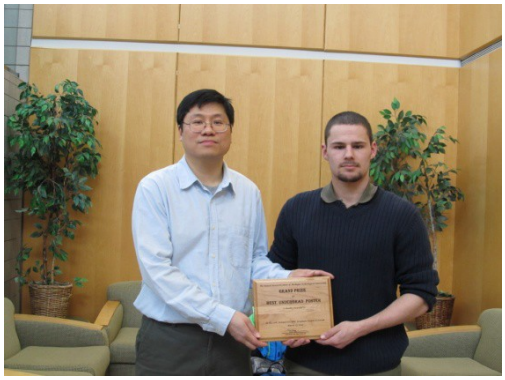
BRC Student Support/Sponsored Activities

The BRC continued to offer research opportunities and financial support to our graduate and undergraduate students through its various initiatives in 2014. The BRC encourages its members to mentor both graduate and undergraduate students who are interested in the research being conducted at the Center. BRC faculty members mentor undergraduate students and continue to volunteer for outreach activities and Summer Youth Programs. 81 graduate students, 15 postdoctoral researchers/research scientists and 83 undergraduate students have the opportunity for to apply for support through its travel awards, fellowships and cash awards and prizes for outstanding presentations at our annual biotech research forum.

BRC Research Forum

The Tenth Annual Student Research Forum sponsored by the Biotechnology Research Center and the Ecosystem Science Center was held on March 19, 2014. Sixty-nine students at both the graduate and undergraduate levels submitted abstracts and posters. Due to the growth in popularity and participation, the BRC and ESC directors decided that it was time for each center to hold its own forum. The BRC chose to hold theirs in the fall; therefore, on October 22 & 23, 2014, the BRC held its Eleventh BRC Research Forum. Forty-one graduate and undergraduate students conducting research in life science, biotechnology, human health, and related areas presented posters. Oral presentations were also given. Speakers included: Dr. Jeremy Goldman (Biomed), Dr. Ashutosh Tiwari (Chemistry), Dr. Hairong Wei (SFRES), Justin Segula (SFRES Graduate Student), Jingtuo Zhang (Chemistry Graduate Student) and Caleb Vogt (Biomed Undergrad Student).





2014 BRC Research Forum Award Recipients

Graduate Student Awards

Grand Prizes
Spring: Connor McCarthy (Biomed, Frost/Goldman)
Fall: Maria Gencoglu (Chem Engg, C Heldt

Merit Awards
Spring: Yiping Mao (Biology, X Tang)
Mu Yang (Chemistry, Tiwari)

Fall: Emily Shearier (Biomed, F Zhao)
Yu Yang (Biomed, J Jiang)

Undergraduate Student Awards

Grand Prizes
Spring: Keegan Yates (Biomed, Zhao)
Fall: Caleb Vogt (Biomed, Frost/Zhao)

Merit Award:
Spring: Michael Bostwick (Biomed, Lee)

BRC Travel Grants

In the spring of 2005, the Biotechnology Research Center began offering travel grants to MTU graduate and undergraduate students and post-doctoral research scientists who present biotechnology related research at national or international conferences. Grants are awarded in the spring and fall each year. Twenty-three applications were submitted in 2014 with eighteen grants awarded totaling $5,550. Students from Biological Sciences, Biomedical Engineering, Chemistry, Chemical Engineering, KIT, Math, Cognitive & Learning Sciences, Materials Science and Engineering and SFRES participated. Since 2005, $83,548 has been awarded as BRC Travel Grants.

Spring 2014 Travel Award Recipients

Andrew Chapp ($200) Experimental Biology 2014 Conference
Colina Dutta ($200) 27th Annual Symposium of the Protein Society
Ida Fonkoue ($250) Experimental Biology 2014 Conference
Jagadeesh Janjanam ($250) 27th Annual Symposium of the Protein Society
Robert Larson ($300) Experimental Biology 2014 Conference
K. Saagar Vijayaragavan ($300) American Chemical Society Meeting
Chungja Yang ($400) International Conference on Multiphase Flow 2013

Fall 2014 Travel Award Recipients

Faten Dhawi Almuhanna ($250) International Plant and Animal Genome XXII Meeting
Ran An ($250) SciX 2013 Conference
Margaret Brunette ($200) Biomedical Engineering Society Annual Conference
Morgan Cencer ($250) American Chemical Society Fall National Conference
David Chadderdon ($300) 2013 AIChE Annual Conference
Kristina Flesher ($300) International Annual Meetings of ASA, CSSA, and SSSA
Azhang Hamlekham ($250) TMS 2014 Annual Meeting & Exhibition
Hal Holmes ($250) Biomedical Engineering Society Annual Conference
Sean Hopkins ($250) 246th American Chemical Society National Meeting
Maryam Khaksari ($200) SciX 2013 Conference
Connor McCarthy ($300) 246th American Chemical Society National Meeting
Ramkumar Mohan ($200) The Midwest Islet Club Meeting
Ji Qi ($250) 2013 AIChE Annual Conference
Aparupa Sengupta ($300) Society for Industrial Microbiology and Biotechnology
Emily Shearier ($200) TERMIS-AM 2013 Conference and Exposition
Maria Tafur ($300) 2013 AIChE Annual Conference
Le Xin ($300) AIChE 2013 Annual Meeting
Mimi Yang ($250) 246th American Chemical Society National Meeting
Keegan Yates ($250) Biomedical Engineering Society National Meeting
Lijun Zhang ($300) MSC 2013 Adult Stem Cell Therapy & Regenerative Medicine Meeting

PhD Finishing Fellowships

In 2008 the BRC established a PHD finishing fellowship to provide partial financial support to PhD students in the final year of their program and who are no longer receiving other financial support. To qualify, applicants must have been supported by BRC affiliated external research grants for at least three years, and they must be in the final year of their PhD program. Fellowships are awarded on an as-needed basis.

BRC Finishing Fellowships Awarded in 2014

Connor McCarthy - $5,000; Summer, 2014 (Biomed, Goldman/Frost)

Venkataramana Pidatala - $2,500; Summer 2014 (Biology, Datta)

Maria Tafur - $2,500; Fall, 2014 (Chem Engg, Heldt)

BRC Invited Speaker Seminars

The BRC seminar series, begun in 2006, has helped support at least 30 speakers invited to the University. Unfortunately, in 2014, weather prevented two guest speakers from arriving. 2014 seminars include:

Dr. Kyung-Hwan Han; Michigan State University; September, 2013.

Dr. Kelly Dyer; University of Georgia; September, 2014.

Dr. Wan-ju Li; University of Wisconsin at Madison; October, 2014.

Dr. Kevin Heffernan; Syracuse University; October, 2014.

FY14 Infrastructure Improvement Grants

Maintaining and upgrading the biotechnology research facilities is vital to the continued success of the BRC and remains a priority of members of the Center. The sharing of equipment and facilities by the Center's researchers is economically and strategically prudent. State-of-the-art equipment and facilities also help attract faculty, graduate students and research scientists to Michigan Tech.

The BRC members voted to continue this initiative resulting in the fifth round of funding (FY15 & FY16). These awards have supported research infrastructure improvements at MTU since 2006. Over $13,500 was awarded to support purchasing equipment valued at more than $182,400 in FY14.

The infrastructure improvement grant guidelines, established in FY06, require a 100% match from other funding sources. These grants are open to all departments represented by the members in the center, and have been primarily used by junior faculty as a supplement to start-up funding. Requests for awards are accepted throughout the two year cycle with the three groups receiving equal amounts each cycle.

Grant	Total Value	BRC Match	Department	Member
Fiber-optic Fusion Splicer	$12,060	$2,502	Biomed	**X Liu**
Enhancement for Electron Microscope	$70,810	$2,000	COE/CSA	**B Lee/ Heiden/ Mazzoleni/ S-Yassar**
Reinstallation of ICP-MS	$30,350	$6,925	CSA	**Datta/ Gretz**
Equipment for Cell Culture & Bio-Imaging Core Facility	$69,000	$2,000	CSA	**Carter/ Bi**
Eppendorf Pipette	$265	$137.50	SFRES	**Gailing**

Research Initiative

Begun in 2011, the BRC Research Initiative provides PIs access to additional funding which helps to support various research projects and assistance with graduate education in biotechnology.

BRC Member	Research Initiative Funds Used Toward:
Shiyue Fang	-Purchase of chemicals for research projects -Support of a post-doc
Megan Frost	-Support of student research and wages
Oliver Gailing	-Support for graduate students who were funded by external scholarships -Gathered preliminary data used for NSF submission
Jeremy Goldman	-Research projects on bioabsorbable stents: resulted this year in 3 papers accepted, 2 papers in revision, and one paper in preparation
Caryn Heldt	- Gathered preliminary data for future grants. Three proposals will be submitted soon based on the preliminary data gathered from funds from BRC Research Initiative (one to NIH on a malaria biosensor, one to NSF on a graphene biosensor and one to the Army on a flexible biosensor -Purchased a sonicator and repaired centrifuge
Jingfeng Jiang	-Repair of power supply of Bose Electroforce Mechanical Testing machine -Partial support of Yu Wang (PhD student) and Dave Rosen (MS student, starting January, 2015) to attend IEEE ultrasonic symposium, Chicago, 2014
CP Joshi	-Used for travel to conferences
Bruce Lee	-Purchaseof replacement battery for laptop
Adrienne Minerick	-Travel for Minerick -Intermittent graduate student support for Hwi Yong Lee, Zhichao Wang, Chungja Yang and Ran An -Publishing fees
Yinan Yuan	-Two week salary for Yuan (with permission from MTU and SFRES)
Feng Zhao	-Purchase of lab supplies

Financial Report

The Biotechnology Research Center continues its tradition of excellence in research, student training and outreach for the benefit of society and the environment with over $12.3 million in 55 research grants and contracts, with the major portion coming from the primary national funding agencies.

In FY2014:
Total research funding: **$12,349,246**
Active Research Projects: **49**
New awards: **26 totaling $4,658,240**
Total Research Expenditures: **$2,117,627**

FY14 IRAD Report

The Biotechnology Research Center had a slight decrease in revenue (IRAD) generated through external research grants in 2014. The IRAD received fund the various BRC initiatives which were established to enhance research efforts of members, their students and research assistants. In special cases, an IRAD waiver may be provided to a BRC member to ease financial constraints of a proposal. The BRC continues to keep its operational budget to a minimum so that the majority of funds generated by the BRC members will help them reach their research goals. In FY14, BRC affiliated projects generated $543,888 in IRAD.

Table: Distribution of BRC IRAD Returns by the Unit in FY 14

Unit	Total BRC Generated IRAD	20% Returned to BRC
Biological Sciences	$76,544	$15,309
Biomedical Engineering	$156,152	$31,230
Chemistry	$30,565	$6,113
Chemical Engineering	$53,230	$10,646
Electrical & Computer Engg	$4,669	$934
Mathematics	$23,714	$4,743
ME-EM	$11	$2
SFRES	$199,003	$39,801
TOTALS	**$543,888**	**$108,778**

Table: Distribution of BRC IRAD Returns by the Colleges and Schools in FY 14:

Unit	Total BRC Generated IRAD	20% Returned to BRC
College of Engineering	$214,062	$42,813
College of Sciences & Arts	$130,823	$26,164
SFRES	$199,003	$39,801
Totals	**$543,888**	**$108,778**

BRC Affiliated Active Grants

Fang
$260,000; 08/11 – 07/15
Purification Synthesis Peptides Using a Catching by Polymerization Approach

Fang, Shahbazian-Yassar, Yuan
$200,000; 05/12 – 04/15
IDBR (EAGER): An AFM-Based Instrument for Monitoring DNA Synthesis in Real-Time

Frost
$450,000; 08/14 – 07/17
Tunable Nitric Oxide Release Materials

Heldt
$174,175; 08/11 – 07/14
BRIGE: Chitosan Electrospun Membrane for Pathogen Removal

Heldt
$274,736; 06/12 – 09-/15
Precipitation and Self-Interaction of Viruses by Preferential Hydration

Minerick
$100,000; 09/12 – 08-/13
Nano and Microprinting Equipment for Novel Bioparticle Separations

Minerick, Raber, Bergstrom
$200,000; 5/14 – 11/15
PFI:AIR – TT: Blood Typing Device without Reagents: Sensing Electrodes to Replace Optics

Minerick
$50,000; 04/13 – 09-/13
I-Corps: ABO-Rh Blood Type Identification Using Dielectrophoretic Microdevice

Tang, G, Wei
$2,499,979; 06/14 – 05/17
Targeting MicroRNAs for Destruction in Crops by Short Tandem Target Mimic (STTM)

Tang, G
$251,592; 11/11 – 07/14
EAGER: RNAi Gene Discovery Tool to Randomly Generate Dominant Mutant Pools in Plants

Bi
$202,263; 08/09 – 07/14
Enhancing the “Barcode” Readability of Color-Labeled Molecular Tags by Linker Engineering to Facilitate Genetic Analysis

Carter
$465,000; 09/14 – 08/17
Sleep Deprivation in Women

Chen
$458,920; 12/14 – 11/17
ER Stress and Reduced SK Channel Function in PVN in Rats with High Salt Intake

Goldman, Frost
$459,600; 05/12 - 04/15
Therapeutic Lymphatic Collecting Vessel Regeneration by Directed Fluid Flow

Goldman
$42,684; 08/13 – 06/16
Small Diameter Blood Vessel

Fang
$333,631; 02/14 – 01/17
Oligodeoxynucleotide Synthesis Using Protecting Groups and a Linker Cleavable Under Neutral Oxidative Conditions

Frost
$86,212; 05/12 – 04/15
Lymphatic Regeneration

Jiang, Kirkpatrick, Rajachar
$450,000; 09/14 – 08/16
Virtual Breast Project: Improving Non-invasive Differentiation of Breast Tumors

Lee
$344,459; 03/13 – 02/16
Biomimetic Tissue Adhesive with Mechanically Tough Hydrogel Support

Rajachar, Ong
$168,774; 08/12 – 07/14
Novel Nano-Mechanical Platform to Investigate Therapeutic Sub-Cellular Mechanical Stimulation

Sha,Zhang
$156,000; 05/12 - 03/14
Statistical Methods for Family-based Association Studies

Zhao
$450,502; 07/13 – 06/16
Development of Off-the-shelf Completely Biological Small-diameter Blood Vessel with Human Stem Cells

Busov, Wei, Lilleskov, Yordanov
$900,000; 08/09-08/14
USDA Feedstock Genomics A system biology approach for elucidation the regulation poplar root system

Busov
$7,000; 10/14 – 09/15
McIntire Stennis: Regulation of Biomass Growth in Trees

Busov, Yordanov, Gailing
$499,916; 05/12 – 04/15
USDA NIFA: Plant Growth and Development Program: Role of Laterial Organ Boundary transcription factors in regulation of wood formation in poplar

Deshpande, Wusirika
$150,000; 02/14-01/16
Bioactive Components in Rice Callus Culture and Blueberry Extract as Anti-inflammatory Agents of the Gastrointestinal Tract

Gailing
$7,000; 10/14 – 09/15
McIntire Stennis: Identification of Genes Involved in the Maintenance of Species Identity in North American Red Oaks

Joshi
$7,000; 10/12 – 09/13
McIntire Stennis: Reengineering of Wood Cellulose Synthesis for Better Bioenergy Production

Wei
$7,000; 10/14 – 09/15
McIntire Stennis: Genetics Manipulation of the Genes Controlling Tree Growth

Yuan, Wei
$149,888; 04/12 – 04/15
Systemic Identification and Characaterization of Overlapping Sense/Antisense Gene Loci in Populus Genome

Busov, Yordanov, Tuskan, Wellington and Sykes
$1,100,000; 8/12 – 7/15
DOE Feedstock Genomics. Gene discovery. Functional discovery and characterization of genes and alleles affecting wood biomass yield and quality in poplar using activation tagging and association analysis

Joshi
$224,000 (total funding about $1.1 million); 09/08 – 07/13
EU-US Transatlantic Masters degree program in Forest Resources (EU-USTMDPFR) Other collaborator Universities include North Carolina State University, NC (PI: Bronson Bullock); University of Helsinki, Finland (PI: Outi Orenius) and Swedish Agricultural University, Sweden (PI: Vilis Brukas)

The Gerber Foundation

Minerick
$219,728; 06/12 – 07/15
Rapid Nutritional Analysis from Infant Tears

Michigan Space Grant Consortium

Heldt
$10,000; 05/12 -12/13
Research Seed Grant: Graphene-based Biosensor for Protein Detection

American Physiological Society

Ross, Carter
$5,000; 01/13 – 02/14
Sleep Efficiency and Neural Cardiovascular Control in Humans
(Faculty mentor for undergraduate student fellowship)

Huron Mountain Foundation

Gailing
$3,000; 02/13 – 01/14
Genetic Structure of Pre-European Settlement Quercus rubra Forests II

Werner
$2,000; 05/14 – 04/15
The Lepidoptera and Drosophilidae of the Huron Mountains

MichiganTech

Carter
$61,000; 07/14 – 08/15
Bio Imaging Core Facility

Durocher
$31,600; 07/13 – 08/15
REF seed grant: The Effect of Diet or Exercise on Visceral Obesity, Neural Cardiovascular Reactivity and Arterial Stiffness in Obese Humans

Fang
$19,000; 07/14 – 08/15
Commercialize Technologies for Biopolymer Purification

Tanasova
$61,000; 07/14 – 08/15
Cell Culture and Bioimaging Core Facility

Tiwari
$24,560; 07/14 – 08/15
Understanding the Role of Protein Aggregation in Cellular Toxicity

Werner
$27,000; 07/12 – 08/14
Evolution of Mushroom Toxin

Werner
$6,100; 07/12 – 08/13
REF Mentor Grant: Evolutionary Ecology

Yuan
$15,000; 07/14 – 08/15
Genome-wide Analysis of Regulatory RNAs Associated with Wood Formation in Populus
REF Mentor Grant: Evolutionary Ecology

North Carolina State University

Wei
$50,758; 02/13 – 05/15
Construction of Gene Regulatory Networks of Wood Formation in Poplar

Portage Health Foundation & Superior Ideas Crowd Fund

Carter, Smoot
$25,000; 01/13 – 02/14
Sleep Apnea and Neurovascular Control in Humans

Penn State

Gailing
$215,077; 04/11 – 06/15
TRPGR: Comparative Genomics of Environmental Stress Responses in North American Hardwoods

SIROM Scientific Solutions LLC

Datta
$77,000; 05/11 – 04/14
A Novel Phytoremediation Method Using Vetiver Grass to Cleanup Lead-Based Paint Contaminated Soils

Southern Illinois University - Carbondale

Datta
$95,094; 09/12 – 08/14
Low-Cost Green Technology to Improve Water Quality in Mining-Impacted Ecosystems

The University of Chicago (passthrough Merck)

Carter
$50,631; 04/14 – 12/15
Multi-Level Assessment of Physiologic Hyper-Arousal in Chronic Primary Insomnia: A Case Control Study

University of Michigan (MIIE)

Jiang, Wang, Bharti
$44,500; 07/14 – 06/15
Translation of Automated Flow Analysis into Clinical Worklow

University of Wisconsin Madison - NIH

Jiang
$15,250; 07/13 – 06/14
Real-Time Ultrasonic Monitorinig of Tumor Ablation

Virginia Polytechnic Institute & State University

Murthy
$50,146; 04/11 – 03/15
Collaborative Research: Functional Characterization of Diphospho and Tripho-inositol Phosphates in Plants

Peer-reviewed Publications in 2014

(Bold = BRC Faculty)

Adams TNG, Turner PA, Janorkar AV, **Zhao F**, **Minerick AR** (2014) Characterizing the dielectric properties of human mesenchymal stem cells and the effects of charged elastin-like polypeptide copolymer treatment. Biomicrofluidics. Accepted.

Aghion E, Guinguis I, **Goldman J** (2014) Corrosion behavior of nano/sub-micron F401 titanium alloy. Advanced Engineering Materials. Accepted.

Anderson J, Lin MH, Privette C, Flowers M, Murley M, **Lee BP**, **Ong KG** (2014) Wireless magnetoelastic sensors for tracking degradation profiles of nitrodopamine-modified poly(ethylene glycol). Sensor Letters. Accepted.

An R, Massa K, Wipf DO, **Minerick AR** (2014) Solution pH change in non-uniform AC electric fields at frequencies above the electrode charging frequency", *Biomicrofluidics,* 8: 064126 DOI: 10.1063/1.4904059.

Bardgett ME, **Chen QH**, Guo Q, Calderon AS, Andrade MA, Toney GM (2014) Coping with dehydration: sympathetic activation and regulation of glutamatergic transmission in the hypothalamic PVN. American Journal of Physiology: Regulatory, Integrative, and Comparative Physiology 306(11):R804-13.

Bowen PK, Drelich A, Drelich J, **Goldman J** (2014) Rates of in vivo (arterial) and in vitro biocorrosion for pure magnesium. Journal of Biomedical Materials Research: Part A. Accepted.

Bowen PK, Drelich J, **Goldman J** (2014) Magnesium in the murine artery: probing the products of corrosion. Acta Biomaterialia 10(3):1475-83.

Bray MJ, **Werner T**, Dyer KA (2013) Two genomic regions together cause dark abdominal pigmentation in *Drosophila tenebrosa*. Heredity 112:454-462.

Brunette M, Holmes H, Lancina MG, He W, **Lee BP, Frost MC, Rajachar RM** (2013) Inducible nitric oxide releasing poly-(ethylene glycol)-fibrinogen adhesive hydrogels for tissue regeneration. MRS Proceedings 1569, 797.

Carter JR, West JB (2013) Space physiology within an exercise physiology curriculum. Advances in Physiology Education 37:220-226.

Cencer M, Liu Y,Winter A, Murley M, Meng H, **Lee BP** (2014) Effect of pH on the rate of curing and bioadhesive properties of dopamine functionalized poly(ethylene glycol) hydrogels. Biomacromolecules 15:2861–2869.

Chapp AD, Gui L, Huber MJ, Larson RA, Gu M, Zhu J, **Carter JR**, **Chen QH** (2014) Sympathoexcitation and pressor responses induced by ethanol in the central nucleus of amygdale (CeA) involves local activation of NMDA receptors in anesthetized rats. American Journal of Physiology: Heart and Circulation Physiology 307(5):H701-9.

Datta R, Kinrade G, Sarkar D (2014) Non-traditional uses of maize: biofuels, remediation and pharmaceuticals. In Genetics, Genomics and Breeding of Maize. Edited by **Wusirika R**, Bohn M, Lai J, Kole C. CRC Press pp 236-255.

DeWall R, **Jiang J**, Wilson J, Lee K (2014) Visualizing tendon elasticity in an ex vivo partial tear model. Ultrasound in Medicine and Biology 40(1):158-167.

Dhadi SR, **Deshpande A**, Driscoll K, **Ramakrishna W** (2013) Major cis-regulatory elements for rice bidirectional promoter activity reside in the 5'-untranslated regions. Gene 526:400–410.

Ding X and **Heiden P** (2014) Recent developments in molecularly imprinted nanoparticles. Macromolecular Materials and Engineering 299(3):268-282.

Ding X, Janjanam J, **Tiwari A**, **Thompson M, Heiden P** (2014) Peptide-directed self-assembly of functionalized polymeric nanoparticles part I: design and self-assembly of peptide-copolymer conjugates into nanoparticle fibers and 3D scaffolds. Macromolecular Bioscience 14(8):853-871.

Durnwald H, Osborne J, Aho H, Billings T, He W, **Frost MC** (2013) formation of stable gelatin layer on Polydimethylsiloxane (PDMS) for cell culture. Open Journal of Biomedical Materials. In Press.

Fueangfung S, Yuan YA, **Fang SY** (2014) Denaturing reversed-phase hplc using a mobile phase containing urea for oligodeoxynucleotide analysis. Nucleosides, Nucleotides & Nucleic Acids. 33:481.

Gailing O (2013) Differences in growth, survival and phenology in *Q. rubra* and *Q. ellipsoidalis* seedlings. Dendrobiology 70:73-79.

Gailing O and Curtu AL (2014) Interspecific gene flow and maintenance of species integrity in oaks. Annals of Forest Research 57:5-18.

Gailing O, Bodénès C, Finkeldey R, Kremer A, Plomion C (2013) Genetic mapping of EST-derived Simple Sequence Repeats (EST-SSRs) to identify QTL for leaf morphological characters in a *Quercus robur* full-sib family. Tree Genetics and Genomes 9:1361-1367.

Gencoglu A and **Minerick AR** (2014) Electrochemical Detection Techniques in Micro- and Nanofluidic Devices. *Microfluidics and Nanofluidics,*17(5), pgs 781-807 DOI: 10.1007/s10404-014-1385-z.

Gencoglu MF, Pearson E, **Heldt CL** (2014) Porcine parvovirus flocculation and removal in the presence of protecting osmolytes. Journal of Biotechnology 186:83-90.

Geng H, Hill CM, Zhu S, **Liu H**, Huang L, Pan S (2013) Photoelectrochemical Properties and Interfacial Charge Transfer Kinetics of BODIPY-sensitized TiO2 electrodes. RCS Advances 3:2306-2312.

Gorsuch J, Long J, Miller K, Primeau K, Rutledge S, Sossong A, **Durocher JJ** (2013) The effect of squat depth on multiarticular muscle activation in collegiate cross-country runners. Journal of Strength and Conditioning Research 27(9):2619-25.

Guo L, Xu Y, Xu Z, **Jiang J** (2014) Reduce noise ultrasonic speckle tracking: A PDE-based regularization approach for breast elastography. Ultrasonic Imaging. In press.

Holmes HR, DeRouin A, Wright S, Lograsso TA, Riedemann TM, Rajachar RM, **Ong KG**, (2014) Biodegradation and biocompatibility of mechanically active magnetoelastic materials. *Smart Materials and Structures* 23, 095036.

Keim A, Slis J, Mendez U, Brown E, Burmeister Y, **Gailing O**, **Goldman J** (2013) The multicomponent medication lymphomyosot improves the outcome of experimental lymphedema. Lymphatic Research and Biology 11:81-92.

Lee BP and Konst S (2014) Novel hydrogel actuator inspired by reversible mussel adhesive protein chemistry. Advanced Materials 26:3415-3419.

Lee BP, Liu Y, Konst S (2014) Novel hydrogel actuator based on biomimetic chemistry. Materials Research Society Proceedings, 1710, mrss14-1710-XX08-01.

Lee HY, Barber C, **Minerick AR** (2014) Improving electrokinetic microdevice stability by controlling electrolysis bubbles. Electrophoresis 35:1782-1789.

Li K, Pidatala VR, Shaik R, **Datta R**, **Ramakrishna W** (2014) Integrated metabolomic and proteomic approaches dissect the effect of metal resistant bacteria on maize biomass and copper uptake. Environmental Science & Technology 48:1184–1193.

Li K, **Ramakrishna W** (2014) Essential information. Book chapter in Genetics, Genomics and Breeding of Maize. Edited by Ramakrishna W, Bohn M, and Lai J. CRC Press. pp 1-13.

Lin M, Hatcher JT, Wurster RD, **Chen QH**, Cheng ZJ (2014) characteristics of single large-conductance Ca2+-activated K+ channels and their regulation of action potentials and excitability in vagal cardiac motoneurons. American Journal of Physiol: Cell Physiology 306(2):C152-66.

Lind J and **Gailing O** (2013) Genetic structure of *Quercus rubra* L. and *Q. ellipsoidalis* E. J. Hill populations at gene-based EST-SSR and nuclear SSR markers. Tree Genetics and Genomes 9:707-722.

Lind-Riehl J, Sullivan AR, **Gailing O** (2014) Evidence for selection on a CONSTANS-like gene between two red oak species. Annals of Botany 113(6): 967-975.

Liu X, Kirby M, **Zhao F** (2014). Motion analysis and removal in intensity variation based OCT microangiography. Biomedical Optics Express 5:3833-3847.

Liua J, Hill CM, Pana S, **Liu H** (2014) Interfacial charge transfer events of BODIPY dye molecules: single molecule spectroelectrochemistry and substrate effects. Physical Chemistry Chemical Physics. In press.

Long F, Cao B, Khanal A, **Fang S**, **Shahbazian-Yassar R** (2014) Single molecular afm probe modification with highly defined surface functionality. Beilstein Journal of Nanotechnology. Accepted.

Ma F, Rehman A, **Liu H**, Zhang J, Zhu S, Zeng X (2014) Glycosylation of quinone-fused polythiophene for reagentless and label free detection of *E. coli*. Accepted to Analytical Chemistry for publication.

Ma J, Wang C, Shene CK, **Jiang J** (2014) Graph-based interface for visual analytics of 3D streamlines and pathlines. IEEE Transactions on Visualization and Computer Graphics 20:1127-1140.

Mi X and **Heldt CL** (2014) Adsorption of a non-enveloped mammalian virus to functionalized nanofibers. Colloids and Surfaces B: Biointerfaces 121:319-324.

Mi X, Vijayaragavan KS, **Heldt CL** (2014) Virus adsorption of water-stable quaternized chitosan nanofibers. Carbohydrate Research 387:24-29.

Mitchell CM, Saul M, Lei L, **Wei H**, **Werner, T** (2014) The mechanisms underlying α-amanitin resistance in *Drosophila melanogaster*: a microarray analysis. PLoS ONE 9(4):e93489.

Moncada-Hernandez H, Nagler E, **Minerick AR** (2014) Assessment of the particle-particle influence on the dielectrophoretic response of microparticles. Electrophoresis 35:1803–1813.

Nookaraju A, Pandey SK, Fujino T, Kim J-Y, Suh MC, **Joshi CP** (2014) Enhanced accumulation of fatty acids and triacylglycerols in transgenic tobacco stems for enhanced bioenergy production. Plant Cell Reports 33:1041-1052.

Owusu SA, Staton M, Jennings TN, Schlarbaum S, Coggeshall MV, Romero-Severson J, Carlson J, **Gailing O** (2013) Development of genomic microsatellites in *Gleditsia triacanthos* L. using Illumina sequencing. Applications in Plant Sciences 1(12):1300050.

Paces WR, Holmes HR, Vlaisavljevich E, Snyder KL, Tan EL, Rajachar RM, **Ong KG** (2014) Application of sub-micrometer vibrations to mitigate bacterial adhesion. *Journal of Functional Biomaterials* 5:15-26.

Papageorgiou AC, Tsiripidis I, Mourati T, Hatziskakis S, **Gailing O**, Eliades NG, Vidalis A, Drouzas AD, Finkeldey R (2014) Complex fine-scale phylogeographic patterns in a putative refugial region of *Fagus sylvatica* L. Botanical Journal of the Linnean Society 174: 516–528.

Pokharel D, Fueangfung S, Zhang M, **Fang S** (2014) Peptide and peptide nucleic acid syntheses using a DNA/rna synthesizer. Biopolymers: Peptide Science. Accepted.

Pokharel D, Yuan YN, Fueangfung S, **Fang SY** (2014) Synthetic oligodeoxynucleotide purification by capping failure sequences with a methacrylamide phosphoramidite followed by polymerization. RSC Advances 4:8746.

Puranik S, Kumar KS, **Gailing O**, **Joshi CP** (2014) Modifying plant cell walls for bioenergy production. CAB reviews 9(17):1-10.

Qi X, **Shan Z**, Ji Y, Guerra V, Alexander JC, Ormerod BK, Bruijnzeel AW (2014) Sustained AAV-mediated overexpression of CRF in the central amygdala diminishes the depressive-like state associated with nicotine withdrawal. Translational Psychiatry 4:e385.

Rajendra KC, Seifert S, Prinz K, **Gailing O**, Finkeldey R (2014) Subtle human impacts on patterns of neutral genetic variation in European beech (*Fagus sylvatica*). Forest Ecology and Management 319: 138-149.

Rakshit S, Sarkar D, Elzinga E, Punamiya P, **Datta R** (2014) Surface complexation of oxytetracycline by magnetite: effect of solution properties. Vadose Zone Journal 13(2):147.

Rakshit S, Sarkar D, Punamiya P, **Datta R** (2014) Kinetics of oxytetracycline sorption on magnetite nanoparticles. International Journal of Environmental Science and Technology 11(5):1207-1214.

Romanowicz GE, He W, Nielsen M, **Frost MC** (2013) Novel device for continuous spatial control and temporal delivery of nitric oxide for in vitro cell culture. Redox Biology 1:332-339.

Sha Q, **Zhang S** (2014) A novel test for testing the optimally weighted combination of rare and common variants based on data of parents and affected children. Genetic Epidemiology 38:135–143.

Sha Q, Zhang S (2014) A rare variant association test based on combinations of single-variant tests. Genetic Epidemiology 38:494-501.

Sha Q, **Zhang S** (2014) Test of rare variant association based on affected sib-pairs. European Journal of Human Genetics. doi:10.1038/ejhg.2014.43 [Epub ahead of print]

Shaik R, **Ramakrishna W** (2013) Genes and co-expression modules common to drought and bacterial stress responses in Arabidopsis and rice. PLoS One 8:e77261.

Shaik R, **Ramakrishna W** (2014) Comparative genomics. Book chapter in Genetics, Genomics and Breeding of Maize**.** Edited by Ramakrishna W, Bohn M and Lai J. CRC Press. pp 120-130.

Shaik R, **Ramakrishna W** (2014) Machine learning approaches distinguish multiple stress conditions using stress-responsive genes and identify candidate genes for broad resistance in rice. Plant Physiology 164:481-495.

Sullivan AR, Lind JF, McCleary TS, Romero-Severson J, **Gailing O** (2013) Development and characterization of genomic and gene-based microsatellite markers in North American red oak species. Plant Molecular Biology Reporter 31:231-239.

Talaga ML, Fan N, Fueri AL, Brown RK, Chabre YM, Bandyopadhyay P, Roy R, **Dam TK** (2014) Significant other half of a glycoconjugate: contributions of scaffolds to lectin-glycoconjugate interactions. Biochemistry 53(27):4445-54.

VanWagner M, Rhadigan J, Lancina M, Lebovsky A, Romanowicz G, Snyder KL, Bostwick M, **Lee BP**, **Frost MC**, **Rajachar RM** (2013) S-nitroso-N-acetylpenicillamine (SNAP) derivatization of peptide primary amines to create inducible nitric oxide donor biomaterials. ACS Applied Material Interfaces 17:8430-8439.

Vegesna G, Janjanam J, Bi J, Luo FT, Zhang J, Olds C, **Tiwari A**, **Liu H** (2014) pH-activatable near-infrared fluorescent probes for detection of lysosomal pH inside living cells. Journal of Materials Chemistry B 2:4500-4508.

Vegesna G, Sripathi S, Zhang J, Zhu S, Luo FT, Jahng WJ, **Frost M**, **Liu H** (2013) Highly Water-soluble BODIPY-based Fluorescent Probe for Sensitive Detection of Nitric Oxide in Living Cells. ACS Applied Materials & Interfaces 5(10):4107–4112.

Vogt C, Xing Q, He W, Li B, **Frost MC**, **Zhao F** (2013) Nitric oxide-releasing gelatin nanofiberous matrix. Biomacromolecules 14:2521-2530.

Wang S, Fang S, **Sha Q**, **Zhang S** (2014) Detecting association of rare and common variants by testing an optimally weighted combination of variants with longitudinal data. BMC Proceedings 8(1):S91.

Wang Y, Helminen E, **Jiang J** (2014) Building a virtual breast elastography phantom lab using open source software. Conference proceeding of IEEE International Symposium on Ultrasonics, Chicago, IL. 4 pages.

Wang Z, Sun C, Vegesna G, **Liu H**, Liu Y, Li J, Zeng X (2013) Glycosylated aniline polymer sensor: amine to imine conversion on protein–carbohydrate binding. Biosensors & Bioelectronics 46:183-189.

Wipf DO and **Minerick AR** (2014) Human red blood cell deformation and crenation under high frequency spatial AC field. Biomicrofluidics 8(2):021803.

Xie H, Tewari R, Fukushima H, Narendra J, **Heldt CL**, King JA, **Minerick AR** (2014) Development of a 3D graphene electrode dielectrophoresis device. Journal of Visualized Experiments 88:e51696.

Xing Q, Vogt C, Leong KW, **Zhao F** (2014) Highly aligned nanofibrous natural extracellular matrix scaffold derived from fibroblast cell sheets. Advanced Functional Materials 24:3027-3035.

Xing Q, Vogt C, Yates K, Qian Z, **Frost MC, Zhao F** (2014) Increasing mechanical strength of gelatin hydrogels by divalent metal ion removal**.** Scientific Reports 4:4706.

Xing Q, Yates K, Bailey A, He W, **Frost MC, Zhao F** (2013) Effects of local nitric oxide release on human mesenchymal stem cell attachment and proliferation on gelatin hydrogel surface. Surface Innovations 1(4):224-232.

Xing Q, Yates K, Tahtinen M, Shearier E**, Zhao F** (2014) Decellularization of fibroblast cell sheets for natural extracellular matrix scaffold preparation. Tissue Engineering C. In Print.

Yang H, **Carter JR** (2013) Sympathetic and cardiovagal baroreflex sensitivity in humans: Comparison of spontaneous methodologies and Valsalva's maneuver. Clinical Autonomic Research 23:133-139.

Yucedag C and **Gailing O** (2013) Differences among *Juniperus excelsa* populations as revealed at morphological traits. Dendrobiology 70:65-72.

Yucedag C and **Gailing O** (2013) Genetic variation and differentiation in *Juniperus excelsa* M. Bieb. populations in Turkey. Trees- Structure and Function 27:547-554.

Yucedag C and **Gailing O** (2013) Morphological and genetic variation within and among four *Quercus petrae*a and *Quercus robur* natural populations. Turkish Journal of Botany 37:619-629.

Zhang J, Yang M, Li C, Dorh N, Xie F, Luo FT, **Tiwari A**, **Liu H** (2014) Near-infrared fluorescent probes based on piperazine-functionalized BODIPY dyes for sensitive detection of Lysosomal pH. Submitted to ACS Applied Materials & Interfaces.

Zhang J, Zhu S, Valenzano L, Luo FT, **Liu H** (2013) BODIPY-based ratiometric fluorescent probes for sensitive and selective sensing of cyanide ion. RCS Advances 3:68-72.

Zhang MC, Pokharel D, **Fang SY** (2014) Purification of synthetic peptides using a catching full-length sequence by polymerization approach. Organic Letters 16:1290.

Zhao X, **Sha Q**, **Zhang S**, Wang X (2014) Testing optimally weighted combination of variants for hypertension. BMC Proceedings 8(1):S59.

Zhao Y, Xing Q, Janjanam J, He K, Long F, Low KB, **Tiwari A**, **Zhao F**, **Shahbazian-Yassar R**, Friedrich C, **Shokuhfar T** (2014) Facile electrochemical synthesis of antimicrobial TiO_2 nanotube arrays. International Journal of Nanomedicine 9(1):5177-5187.

Zhu S, Bi J, Vegesna G, Zhang J, Luo FT, Valenzano L, **Liu H** (2013) Functionalization of BODIPY dyes at 2,6-positions through formyl groups. RCS Advances 3:4793-4800.

Zhu S, Zhang J, Vegesna G, Luo FT, Wei J, **Tiwari A**, **Liu H** (2013) Highly water-soluble, near-infrared emissive copolymeric BODIPY dye bearing rgd peptide residues for cancer imaging. Analytica Chimica Acta 758:138-144.

Zhu S, Zhang J, Janjanam J, Vegesna G, Luo FT, **Tiwari A**, **Liu H** (2013) Highly water-soluble BODIPY-based fluorescent probes for sensitive fluorescent sensing of zinc (II). Journal of Materials Chemistry B 1:1722–1728.

Zubcevic J, Jun JY, Kim S, Perez PD, Afzal A, **Shan Z**, Li W, Santisteban MM, Yuan W, Febo M, Mocco J, Feng Y, Scott E, Baekey DM, Raizada MK (2014) Altered inflammatory response is associated with an impaired autonomic input to the bone marrow in the spontaneously hypertensive rat. Hypertension 63(3):542-50.