UAB Grand Challenge Planning Grant Proposal

Better Recycling for Better Birmingham (BRBB)

Birmingham 2035: Making it the Best City in the Southeast through Enhanced Recycling

Name and Contact Information for the Principal Investigators:

Robert W. Peters, Ph.D., P.E. Professor of Environmental Engineering Department of Civil, Construction, and Environmental Engineering University of Alabama at Birmingham 1075 13th Street South Birmingham, Alabama 35294-4440 Phone: (205)-934-8434 e-mail: rwpeters@uab.edu	**Haibin Ning, Ph.D.** Assistant Professor of Materials Science and Engineering Department of Materials Science and Engineering Materials Processing and Applications Development (MPAD) Center University of Alabama at Birmingham 1150 10th Avenue South Birmingham, Alabama 35294 Phone: (205)-996-7390 e-mail: ning@uab.edu

List of Identified and Potential Team Members and/or Organizations and Their Roles:

Member	Affiliations	Role
Robert W. Peters	Professor, UAB Department of Civil, Construction, and Environmental Engineering	Principal Investigator
Haibin Ning	Assistant Professor, UAB Department of Materials Science and Engineering	Principal Investigator
Rama Krishna	Professor emeritus, UAB Department of Biochemistry and Molecular Genetics	Coordinator for planning meeting
Vinoy Thomas	Assistant Professor, UAB Department of Materials Science and Engineering	Coordinator for materials recycling demonstration and display
Price Julie	Sustainability Manager, UAB Office of Sustainability Program	Liaison with city sustainability
Manoj Mahapatra	Assistant Professor, UAB Department of Materials Science and Engineering	Coordinator for materials recycling workshop
Charlie Monroe	Assistant Professor, UAB Department of Materials Science and Engineering	Coordinator for K-12 school visits
J. Ashlyn Manzella	Course instructor, UAB Engineering and Innovative Technology Development	Coordinator for planning meeting
Selvum Pillay	Chair and Professor, UAB Department of Materials Science and Engineering	Speaker for planning meeting

Steven Thompson	Lab manager, UAB School of Engineering	Coordinator for planning meeting
Peter Walsh	Research Professor, UAB Department of Mechanical Engineering	Coordinator for materials recycling workshop
Jon Paolone	Former Recycling Coordinator at UAB	Liaison with materials recycling companies
Maria Auad	Director and Professor, Center of Plastics and Advanced Composites, Auburn University	Speaker for planning meeting
Direcus Cooper	Storm water specialist, City of Birmingham, Department of Planning, Engineering, and Permits	Liaison with City of Birmingham
Amy Templeton	CEO and President, McWane Science Center, Birmingham, AL	Speaker for planning meeting
Eugenia Kharlampieva	Associate Professor, UAB Department of Chemistry	Coordinator for materials recycling workshop
Maria Espinosa	Research Assistant, UAB Department of Chemistry	Coordinator for K-12 school visits
Fouad H. Fouad	UAB Director of Sustainable Smart Cities Research Center (SSCRC), Chair and Professor of Department of Civil, Construction, and Environmental Engineering	Coordinator for materials recycling demonstration and displays
Felicia Buck	Executive Director, Alabama Environmental Council	Speaker for planning meeting
Ray Clark	Vice Chair of Solid Waste Authority of the City of Birmingham	Liaison with Solid Waste Management, City of Birmingham
Alan Hill	Executive Director, University of Alabama - Alabama Productivity Center	Speaker for planning meeting
Claudiu Lungu	Professor, UAB Department of Public Health	Liaison with Public Health Department
George Munchus	Professor, UAB School of Business	Liaison with Economics of materials recycling
McWane Science Center, Birmingham, AL	N/A	Site for materials recycling displays and demonstration
Alabama Environment Council	N/A	Consultant and Collaborator

Table of Content

1. Background and Motivation

Recently UAB has launched a grand challenge intended to address important and vital needs in different fields for our city and our state. Materials recycling is selected to be one of the challenge topics for obvious reasons. Currently the recycling rate in the Alabama is only 9% according to a report issued by Alabama Department of Environmental Management (ADEM), and 91% of the solid materials/waste goes to the landfills. The recycling rate in Alabama is significantly lower than the national recycling average which is 34.3% [1].

It is well known that the materials sent to the landfills can cause adverse issues such as air pollution, water pollution, and soil pollution to our communities. People living near certain landfills have an increased risk of cancer [2]. However, more and more solid waste are generated which forces existing landfills to be expanded or more landfill sites to be built to accommodate the ever-increasing amount of solid waste. Figure 1 shows a pile of garbage at Birmingham Eastern Landfill near Trussville that is being expanded [3]. The amount of waste created per month in Alabama with a population of 4.875 million is 383,300 tons [4]. Although there is no statistics found for the amount of solid waste generated in Birmingham, it is estimated that metro Birmingham creates solid waste of approximately 80,000 tons per month based on its population of 1.145 million (4~5 lbs per person per day). The volume of Regions Field is approximately 10 million ft^3, and the solid waste created in one month in Birmingham is approximately 40 million ft^3 which can fill the Regions Field by 4 times. In addition, it costs to dispose of the solid waste to the landfill. The solid waste disposal fee is $1/ton for all solid waste disposed in the landfills in Alabama and that cost is expected to increase. Studies have shown that a 10% increase in recycling rate could provide an additional $3,000,000 in state tax revenue, $66,000,000 in personal income and 1,400 new jobs [5]. Another study also shows that the recycling in Alabama has a direct impact on 32,400 jobs for the state [6]. Therefore, from the viewpoint of both environmental protection and economic impact, it is indeed an urgent and pressing need to increase the recycling rate and reduce the solid waste in our city, our state, and our Southeastern region of the U.S.

Figure 1. Trucks work on a pile of garbage at Birmingham's Eastern Landfill near Trussville [3].

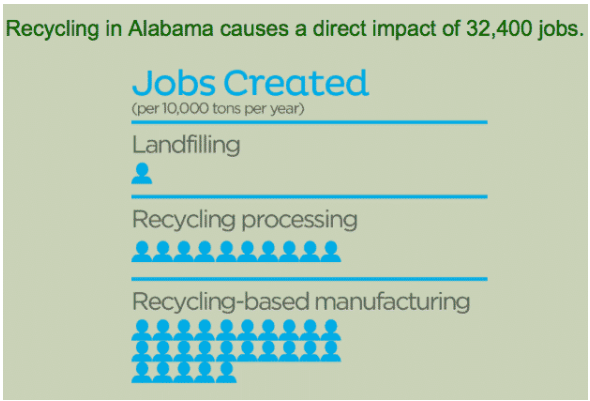

Figure 2. Economic impact of material recycling in Alabama [6].

To address that issue, a multi-discipline team with expertise in materials science and engineering, civil and environmental engineering, biochemistry, chemistry, biology, mechanical engineering,

public health, manufacturing, sustainability, and business has been formed to face that grand challenge of recycling initiatives. In this program, we will focus on initiating educational programs on recycling, promoting materials recycling activities, and developing research projects through collaborated efforts of UAB, the City of Birmingham, regional industries and organizations. Our short term goal is to reduce the amount of solid waste going to landfills by 50% by 2035 in the greater metropolitan Birmingham area and impel our city to be the best in recycling and waste management practices in the Southeastern U.S. by 2035. Our ultimate goal is to achieve 0% solid waste in the metro Birmingham area by 2050.

2. Planning Grant Objective

The objectives of the planning grant are:

- To arrange a planning/scoping meeting in Birmingham, AL, with the team members from UAB, the City of Birmingham, industrial partners, and other local and state entities and to propose and discuss potential projects and plans for the Materials Recycling full proposal.
- To communicate through personal visits, conference calls, survey questionnaires, and initiate communication among UAB and other organizations, and plan for the full proposal for the Materials Recycling grand challenge.
- To organize a workshop that provides demonstration and hands-on experience for K-12 students in materials recycling.

3. Broader Impact

Recycling has become a more pressing and urgent need for our communities. With more recycling, we can reduce/eliminate materials being sent to landfills, protect our environment from pollution, reserve our natural resources for future generations, reduce energy consumption in manufacturing, create for-profit industries and create jobs, and most importantly, improve the quality of life and public health for our residents in our city and our state. The drive for efficient material recycling also stimulates innovations, which is a key to the long-term sustainable economic growth. One of the examples is a research program to be developed by using the recycled materials for 3D printing shelters for homeless people. This program will have a significant impact on our communities in both increasing recycling rate and reducing the number of the homeless people.

4. Team

The materials recycling team is led by Dr. Robert W. Peters and Dr. Haibin Ning and has 25 members with expertise in different fields such as materials engineering, environmental engineering, chemistry, biochemistry, business, biology, mechanical engineering, sustainability, and public health. Both Dr. Peters and Dr. Ning are UAB faculty members in the School of Engineering. Dr. Peters is an expert in environmental research and has more than 30 years in the research of water and air pollution. Prior to becoming a faculty member at UAB, he was the Research Area Leader addressing treatment of contaminated soils and groundwater at Argonne National Laboratory. Dr. Ning is a member of recycling committee of American Composites Manufacturers Association (ACMA), the world's largest plastic based composites industry trade group (see the letter of support from ACMA recycling committee in Appendix A), and he has extensive research and teaching experience in recyclable plastics and plastic based composites. Dr. Ning is among several inventors who developed a lightweight impact resistant panel (US patent)

that passed National Storm Shelter Association (NSSA) Category 5 (the highest category) tornado impact testing [7]. Half of the material used in the panel is recycled plastics. Overall, a total of ten UAB departments and a number of non-UAB organizations (see support letters in Appendix A) will be involved in the planning grant. The PIs and team members are listed in the cover page and their affiliations and roles are also described.

5. Activity Arrangement

Several activities will be arranged for the planning stage of this grand challenge proposal, including a planning meeting (all team members), a visit to a city excelling in recycling activities (4 members), a workshop for material recycling (10 members), two visits to local K-12 schools (10 members). Each of these activities is briefly described below.

5.1 Planning meeting

The planning meeting will be held on Oct 31st, 2018 (tentative date) at the University of Alabama at Birmingham, Materials Processing & Applications Development (MPAD) Center, UAB Campus, Birmingham, Alabama. The PIs and team members will attend the planning meeting. UAB Vice presidents for Research, Dr. Chris Brown, UAB Grand Challenge Project Manager, Dr. Lee Moradi, UAB grand challenge Executive Assistant, Jamie Seitz, and Deans from the schools involved in materials recycling will be invited to the meeting.

The planning meeting will be structured to accomplish the following objectives:

- Identify available resources for materials recycling;
- Discuss potential educational programs and research programs;
- Discuss potential funding opportunities;
- Discuss the strategy for the full proposal preparation.

A tentative agenda of the planning meeting is provided below:

Oct. 30th, 2018	6:00–8:00 p.m. Dinner meeting before the planning meeting
Oct. 31st, 2018	Planning meeting
9:00 am	Registration
9:30 am	Opening Remarks; Dr. Brown; Dr. Moradi; Dr. Peters and Dr. Ning
10:00 am	Project Presentation – The environmental impact of materials recycling
10:30 am	Break
11:00 am	Project Presentation – Education/awareness on materials recycling
11:30 am	Project Presentation – Composting of solid waste
12:00	lunch
1:00 p.m.	Visit to MPAD lab; demonstration of materials recycling
1:30 p.m.	Project Presentation – Reusing and repurposing recycled materials
2:00 p.m.	Discussion and planning – Poster and Post-it session 1
3:00 p.m.	Break
3:30 p.m.	Discussion and planning – Poster and Post-it session 2
4:30 p.m.	Full proposal outline and closing remarks

One of the topics for the planning meeting will be developing extensive research programs for reusing and repurposing recycled materials. Over last decades, recycled materials such as plastics or electronic waste have been exported to eastern or southeastern Asian countries until the policy

change takes place recently on constraining importation of recycled materials in those countries. Therefore, there is an extremely urgent need to develop research in our city, state and nation in composting solid waste, reusing and repurposing the recycled materials. Research topics will be discussed in different aspects to explore the approaches to compost, reuse, and repurpose the solid waste, including: (a) composting of the food related to generate clean energy; (b) product development for infrastructure and other applications using recycled materials; (c) uses of materials mined from existing landfills; (d) bacteria digestion of plastics; (e) develop 3D printing materials from recycled materials; (f) automatic sorting technology for plastics; and (g) research on recycling plastic/grocery bags, to name a few.

5.2 Material recycling workshop

The workshop on material recycling will be hosted at Materials Processing and Applications Development Center on Dec 12th, 2018 (tentative date) as an outreaching activity for educating the awareness of materials recycling. The effectiveness of the workshop will be evaluated through a post-workshop questionnaire and its outcome will be used to prepare for the full proposal. One of the PIs, Dr. Haibin Ning, works at the center that has a space of 30,000 ft^2. His research group at MPAD has been conducting research and development closely related to materials recycling. Large scale equipment are available in the Center (see Appendix B) for processing of recycled materials, including plastics and metals. Figure 3(a) shows the tornado shelter panel developed at the Center that underwent only minimal damage after being impacted by a 15-lbs 2x4 wood at 100 miles per hour (Category 5 Tornado testing standard) using recycled materials [7–9]. Figure 3(b) and (c) show a Frisbee and a coaster prototyped at the Center using recycled materials, respectively. The Center has also been working with The City of Birmingham currently to develop a drainage cover using recycled materials (see the support letter from Department of Planning, Engineering, and Permits, City of Birmingham). The workshop will be hosted to demonstrate the methods of recycling plastics, composites, and metals and repurposing the recycled materials for developing new products. It is planned that 30 students from local middle schools and high schools will be recruited for the workshop.

Figure 3(a) The panel that passed NSSA Category 5 tornado impact test, (b) a Frisbee, and (b) a coaster developed at UAB MPAD Center using recycled plastics.

5.3 A visit to San Francisco

San Francisco has been the leader of recycling materials for the last 20 years. Their recycling rate has been increased from 50% in 2000 to 80% [10]. The PIs and two additional team members will visit San Francisco in December to investigate the mechanisms of recycling materials and waste management practices. The findings will be used for the full proposal preparation.

5.4 Visits to regional recycling business

At least two visits to regional recycling business will be arranged for members in December 2018 and January 2019. There are dozens of materials recycling companies in Alabama [6]. For example, KW Plastics, located in Troy, Alabama, is one of the plastic recycling companies and it is the world's largest plastics recycler for high density polyethylene and polypropylene materials. The visits will provide information of the current market situation and economics of materials recycling, which will be used for preparing for the full proposal.

5.5 Visits to local K-12 schools

At least two visits to local middle and high schools will be arranged this November to distribute the knowledge of materials recycling and recruiting activity for the workshop and general admission to UAB.

5.6 Recycling demonstration at McWane Science Center

There are approximately 360,000 visitors to the McWane Science Center in our city every year. In addition to bringing the concept of materials recycling to the classrooms for K-12 grades, we also plan to expose the students who visit the center to the material recycling ideas and the methods of effective recycling. We will visit the science center in November to set up demonstrations and displays related to material recycling (see the support letter from McWane Science Center). The basic idea is to investigate the attractiveness of the materials recycling demonstrations and displays and the outcome will be used for preparing for the full proposal.

6. References

[1] Dolly Shin, Generation and Disposal of Municipal Solid Waste (MSW) in the United States – A National Survey, Columbia University Earth Engineering Center, 2014.
[2] Lewis-Michl, E. L. Investigation of cancer incidence near 38 landfills with soil gas migration: New York State, 1980-1989. Epidemiology. Vol. 11. No. 4. 2000.
[3] http://www.newslocker.com/en-us/region/alabama/birmingham-landfill-expansion-to-cost-7-million/, accessed in Sept 2018.
[4] A Plan for Boosting Residential Material Recovery and Recycling in Alabama, Alabama Department of Environmental Management, Land Division Solid Waste Branch 2016
[5] Economic Impact of Recycling in Alabama and Opportunities for Growth, Alabama Department of Environmental Management, 2012.
[6] https://bhamnow.com/2018/02/08/recycling-one-alabamas-important-industries-new-jobs/, accessed in Sept 2018.
[7] U. Vaidya, S. Pillay, H. Ning, and B. Thattai, Modulus Shelters Comprising Composite Panels, Application Patent WO2014031169 A1, Feb 2014.
[8] http://www.uab.edu/news/research/item/2681-uab-researchers-successfully-test-advanced-tornado-shelter-panels, accessed in Sept 2018.
[9] https://www.compositesworld.com/blog/post/innovative-tornado-panels-made-from-composites, accessed in Sept 2018.
[10] https://www.cnbc.com/2018/07/13/how-san-francisco-became-a-global-leader-in-waste-management.html, accessed in Sept 2018.

Proposed Budget (Better Recycling for Better Birmingham)

Principal Investigator:	**Haibin Ning and Robert Peters**			
PERIOD OF PERFORMANCE:	**10/16/2018 to 01/31/2019**			
PROPOSAL TITLE:	**Better Recycling for Better Birmingham (BRBB)**			
	Role on Project	**Salary requested**	**Fringe Benefits**	**Total**
Haibin Ning	PI	0	0	0
Robert Peters	PI	0	0	0
Honorarium for planning meeting speakers ($500/speaker)				$ 4,000
Accommodation for invited speakers				$ 1,000
Dinner, breakfast, refreshments, lunch catering for planning meeting				$ 7,500
Travel to regional plastics and materials recycling companies				$ 500
Travel to a city exceling in materials recycling				$ 8,000
Demonstration booth of materials recycling at McWane Science Center				$ 4,000
Breakfast, refreshments, lunch catering for Materials Recycling Workshop for local K-12 students				$ 3,000
Equipment use at MPAD center for Materials Recycling Workshop for local K-12 students				$ 2,000
TOTAL PROPOSED COST				$ 30,000

Budget Justification

1. **Salaries ($0)**

   No salary is requested.

2. **Planning meeting (total $12,500)**

   $500 is requested as honorarium for each invited speaker for the planning meeting. A total of 8 speakers will be invited. Total: $4,000.

   $1,000 is requested for the accommodations for the invited speakers.

   $7,500 is requested to pay for the dinner, breakfast, refreshments, lunch catering for the planning meeting.

3. **Travel ($8,500)**

   A total of $500 is requested for the travel to regional materials recycling companies. Two trips for 5 members each will be arranged.

   $8,000 is requested for visiting a city that excels in materials recycling (4 members).

4. **Setting up demonstration booth at McWane Science Center ($4,000)**

   $4,000 is requested to set up a demonstration booth of materials recycling at McWane Science Center in Birmingham, AL.

5. **Materials Recycling workshop for K-12 students ($5,000)**

   $3,000 is requested for breakfast, refreshments, lunch catering for Materials Recycling Workshop for local K-12 students.

   $2,000 is requested for equipment use at MPAD center for Materials Recycling Workshop for local K-12 students.

Robert W. Peters, Ph.D., P.E.
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Phone (work): (205) 934-8434

Education:

- Ph.D. Chemical Engineering – Iowa State University, Ames, Iowa – 1980
- M.S. Chemical Engineering – Iowa State University, Ames, Iowa – 1978
- B.S.Ch.E. Chemical Engineering – Northwestern University, Evanston, Illinois – 1974

Professional Experience:

October 2004 – Present: Professor of Environmental Engineering/UAB
August 2001 – October 2004: Associate Professor of Environmental Engineering, Department of Civil and Environmental Engineering, University of Alabama at Birmingham, Birmingham, Alabama 35294
September 2000 – August 2001: Vice-President of Technology Development, TechSavants, Inc., 420 South Wright Street, Naperville, Illinois 60640
1993 – August 2000: Research Area Leader, Chemical and Biological Technology Section (1999–2000)/Waste Management and Bioengineering Section (1993–1999), Energy Systems Division, Argonne National Laboratory, Argonne, Illinois 60439
1992–2000: Environmental Systems Engineer, Waste Management and Bioengineering Section, Energy Systems Division. Argonne National Laboratory, Argonne, Illinois 60439
1987–1991: Environmental Systems Engineer, Waste and Safety Engineering Section, Energy Systems Division, Argonne National Laboratory, Argonne, Illinois 60439
1980–1987: Assistant Professor of Environmental Engineering, School of Civil Engineering, Purdue University, West Lafayette, Indiana 47907
1979–1980: Research Assistant, Department of Chemical Engineering, Iowa State University, Ames, Iowa 50011
1975–1979: Teaching Assistant, Department of Chemical Engineering, Iowa State University, Ames, Iowa 50011
1974–1975: Chemical Engineer, Texaco, Inc., Research and Development, Port Arthur, Texas

Publications:

Peer-Reviewed Book Chapters:

- Matute, W.G., M.K. Mostafa, D. Attoh, R.C. Chawla, and R.W. Peters, 2016. "Chapter 6: Sustainable Water Management", ***Sustainable Water Management and Technologies***; pp. 161–174 in Volume I: *Sustainable Water Management*, editor: Daniel H, Chen, CRC Press, Boca Baton, FL.
- Mostafa, M.K., J.O. Ighere, R.C. Chawla, and R.W. Peters, 2016. "Chapter 3: Groundwater Protection and Remediation", ***Sustainable Water Management and Technologies***; pp. 53–78 in Volume II: *Sustainable Water Technologies*, editor: Daniel H, Chen, CRC Press, Boca Baton, FL.
- Mostafa, M.K., R.C. Chawla, and R.W. Peters, 2016. "Chapter 7: Wastewater Treatment, Reuse, and Disposal", ***Sustainable Water Management and Technologies***; pp. 199–237 in Volume II: *Sustainable Water Technologies*, editor: Daniel H, Chen, CRC Press, Boca Baton, FL.
- Brodie, S., A. Ingles, Z. Colville, A. Amekudzi, R.W. Peters, and V. Sisiopiku, 2013. "A Review of Sustainability Rating Systems for Transportation and Neighborhood-Level Developments", pp.337–354 in ***Green Streets, Highways and Development 2013: Advancing the Practice***, ASCE T&DI Conference), A.A. Amekudzi, S.L. Otto, D.J. Carlson, and M.A. Bomar, Eds., American Society of Civil Engineers, New York, NY.

Journal Papers (peer reviewed)

- Mostafa, M., M.S. Mahmoud, and R.W. Peters, 2015. "Use Statistical Analyses to Assess Water Quality at the Damietta Branch of the Nile River, Egypt". ***Journal of Environment and Biotechnology Research***, ***2*** (1): 16–26.

Invited Conference Presentation:

- Peters, R.W., 2016. "Keynote Address: Use of GIS and Drone Technology to Monitor/Assess System Health Performance", Keynote address presented at the 9th Alexandria International Conference on Structural and Geotechnical Engineering, Alexandria University, Egypt, (December 19–21).
- Mostafa, M., R.W. Peters, and H. Taherian, 2016. "Integrating Solar Thermal Technologies with Green Buildings in Birmingham, Alabama", ***1st International Conference on Sustainable Construction and Project Management***, Cairo, Egypt, (March 29–31).
- Barbour, N., S. Gaston, M. Burns, and R.W. Peters, 2013. "Implementation of Tower Gardens on an Urban University Campus", [Paper No. 245a], Paper presented at the 2013 AIChE Meeting, San Francisco, CA, (November 2 – 8).

Workshop/Seminar/Webinar/Conference Presentations:

- Peters, R.W., and S. Cutts, 2017. "Sustainability Design and Rating Systems", STRIDE workshop presentation given in Room 105 of the Business and Engineering Complex (BEC) at the University of Alabama at Birmingham (UAB), Birmingham, AL, (March 24).
- Peters, R.W., 2017. STRIDE-Funded Research Summer Seminar: "Training Modules on Green/Sustainability Design and Rating Systems", Seminar presented at the University of Florida, Gainesville, FL, (June 2).
- Peters, R.W., 2017. STRIDE Webinar: "Training Modules on Green/Sustainability Design and Rating Systems", Webinar presented on June 23, 2017 through STRIDE.
- Lackey, D., and R.W. Peters, 2013. "Experimental Investigation Using a Contaminant Monitoring System in Storm Drains: A Dichotomous Preliminary Risk Assessment", [Paper No. 477d], Paper presented at the 2013 AIChE Meeting, San Francisco, CA, (November 2–8).
- Li, Z., M. Winslett, and R.W. Peters, 2013. "Design of Underground Storage Tanks Involving Water Collection for Water Reuse of Irrigation Purposes: A Case Study for the Campus Green Area of UAB", Paper presented at the 2013Alabama Water Resources Conference, Orange Beach, AL, (September 5–6),
- Peters, R.W., 1995. ***Final Report: An Investigative Study of Options for Recycle and Reuse of Research Solvents***, Final Report to Environmental Management Operations, Argonne National Laboratory, Argonne, IL, (September).
- Peters, R.W., C.A. Wentz, and J.R. Thuot, 1991. "Development and Pilot Demonstration Program of a Waste Minimization Plan at Argonne National Laboratory", ***Proc. 46th Purdue Indus. Waste Conf.***, ***46***: 833−842.
- Peters, R.W., and J.R. Thuot, 1991. "Development of a Waste Minimization Plan at Argonne National Laboratory", ***Proc. 23rd Mid-Atlantic Indus. Waste Conf.***, ***23***: 37−51.

Service:

- Coordinate activities of environmental engineering faculty.
- Serve as Chair of School of Engineering Promotion & Tenure Committee, October 2017 – present.
- Serve as Chair of School of Engineering Graduate Programs Committee, October 2016 – present.
- Serve as School of Engineering representative on UAB Graduate Curriculum Committee, October 2016 – present.
- Serve on School of Engineering representative on Chemical Safety and Environmental Management Committee (CSEMC), (2012 – present).
- Chair of subcommittee on Sustainable Laboratories for CSEMC, (2016 – present).
- Serve as departmental Graduate Program Coordinator, August 2007 – present.
- With American Institute of Chemical Engineers' (AIChE) Environmental Division, have served as: Director, 1985 – 1987; 2nd Vice Chair, 1988; 1st Vice Chair, 1989; Chair, 1990; Past Chair, 1991; Director, 1998 – 2000; Secretary, 2003 – present (8 consecutive 2-year terms)

Graduate Student Advising:
Thesis/Dissertation Advisor: Zhuo Li (PhD, 2017; MS, 2012); Shatha Salah (MS, 2016); Sana Daabish (MS, 2015); John Kinney (MS, 2015); Julia Ashlyn Manzella (MS, 2015); Brittany Pitts (MS, 2014); Ali Badiee (MS, 2014); Mohamed Mostafa (PhD, 2014); Jason Heberling (PhD, 2014); Atul Kajale (PhD, 2013; MS, 2010); Roxanne Bessette (PhD, 2012); Candace Watson [PhD, 2011; MS, 2009]; TaShundra Jones (2011); Dana Lackey (MS, 2010); Scott Gibbs (MS, 2009); Tracy Williams (MS, 2007); Karthick Babu Poosekar (MS, 2006); Harshed Shetye (MS, 2006); Mohammad Aslam (MS, 2006); Edith Horn Geloneck (MS, 2006); Samrat P. Dutta (MS, 2005); Amos Michael Horton (MS, 2005); Ananthakrishna Ananthanarayanan (MS, 2005); Jaimini Upadhyaya (MS, 2004), Jan Mohammad (MS, 2004), Adria Lotus (MS, 2004), Mandeep Kaur Gill (MS, 2003), James Waihenya (MS, 2003), Onder Ayyildiz (PhD, 2003), Po-Yao Kuo (PhD. 1998), Mary S. Quinn (MS, 1998), Linda Shem (MS, 1991), Young Ku (PhD, 1986), Tsun-Kuo Chang (PhD, 1985).

Graduate Students Currently Supervising:
Doctoral Students:

• Sandra Cutts • Ashlyn Manzella	• April Nabors • Jaquice Hughes Boyd

Masters' Students:

• Seyma Demirci	• Phung Ngo	• Dale Bailey

Recent Research Projects/Research Interests [Research funding brought into UAB to date (either as PI or co-PI) ~$3,000,000 in direct research funding]
- Use of raised bed gardens and tower gardens to address urban food deserts;
- Use of GIS technology to identify urban food desert neighborhoods.
- Evaluation of lead contamination in water distribution systems;
- Vertical gardening system performance;
- Integration of sustainable engineering systems in green roofs; and
- Incorporation of chemical sensors in storm drains.

While at Argonne National Laboratory (ANL), investigated recycling of waste solvents at ANL, development of waste minimization plan for ANL, and mining of landfills.

Professional Registrations:
- Registered Professional Engineer, PE #20196 (Indiana) and PE #6417793 (Illinois); currently seeking registration in the State of Alabama (pre-application has been approved for PE licensure in Alabama).

Memberships:
- American Institute of Chemical Engineers (AIChE); currently Secretary of the Environmental Division; Book Review Editor for the journal ***Environmental Progress & Sustainable Energy***.
- American Chemical Society
- Alabama Water Resources Association
- National Society of Professional Engineers/Alabama Society of Professional Engineers

Honors/Awards:
- Departmental nomination for UAB Excellence in Mentorship Award, 2018
- Invited member of Chemical PAKS Survey Creation Meeting, National Council for Examiners of Engineering and Surveying (NCEES), Atlanta, Georgia, (October 6–7, 2017).
- Invited keynote speaker at the 9th Alexandria International Conference on Structural and Geotechnical Engineering, Alexandria, Egypt, (December 19–21, 2016).
- Recipient of AIChE Environmental Division Service Award, November 2014.
- Guest Editor for Special Issue on Hazardous Waste Treatment in the journal ***Applied Sciences***.

Haibin Ning, PhD
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Education

Ph.D. (Dec. 2006): Materials Engineering. University of Alabama at Birmingham.
M.S. (July 2000): Materials Physics and Chemistry, Guangxi University, China.
B.E. (July 1997): Materials Engineering, Central South University, China.

Professional Experience

- Tenure track Assistant Professor (10/01/2016 – present), Department of Materials Science and Engineering, University of Alabama at Birmingham
- Research Assistant Professor (11/15/2010 - 09/30/2016), Department of Materials Science and Engineering, University of Alabama at Birmingham
- Research Associate (08/01/2008 – 11/14/2010), Department of Materials Science and Engineering, University of Alabama at Birmingham
- Postdoc fellow (01/01/2007 – 07/31/2008), Department of Materials Science and Engineering, University of Alabama at Birmingham

Patents

- Haibin Ning, Uday Vaidya, and Selvum Pillay, Hybrid Composite Gear with Enhanced Strength and Wear Resistance, WO2017079147A1.
- Selvum Pillay, and Haibin Ning. Fastening devices for landing string buoyancy and other solutions, US20180086012A1.
- Haibin Ning and Uday Vaidya, Multifaceted Protective Helmets, WO 2015047491 A2, April 2015.
- Uday Vaidya, Selvum Pillay, Haibin Ning, and Balaji Thattaiparthasarthy, Modulus Shelters Comprising Composite Panels, Application Patent WO2014031169 A1, Feb 2014.
- Selvum Pillay, Uday Vaidya, J Barry Andrews, and Haibin Ning, Design and Manufacturing of Long Fiber Thermoplastic Thin Walled Aeroshell for Missile Applications. US Patent #8,846,189, Sept 2014.
- Uday Vaidya, Selvum Pillay, J Barry Andrews, and Haibin Ning, Long Fiber Thermoplastic Thin-Walled Baseplates for Missile Applications and Methods of Manufacture. US Patent #8,277,933. Oct 2012.

Peer Reviewed Journal Papers

- Qiushi Wang, Haibin Ning, Uday Vaidya, Selvum Pillay, and Leigh-Ann Nolen. "Fiber Content Measurement for Carbon Fiber–Reinforced Thermoplastic Composites Using Carbonization-in-Nitrogen Method," ***Journal of Thermoplastic Composite Materials***, ***31*** (1): 79–90, 2018.
- Pritesh Yeole, Haibin Ning, Ahmed Arabi Hassen, and Uday Vaidya. "The Effect of Flocculent, Dispersants, and Binder on Wet–laid Process for Recycled Glass Fiber/PA6 Composite", ***Polymers & Polymer Composites***, ***26*** (3): 259-269, 2018.
- Siddhartha Brahma, Vikas Patel, Selvum Pillay, Haibin Ning, and Vinoy Thomas. "Enhancement of Mechanical Properties via Strategic Placement of Tows and Fabric on Discontinuous Carbon Fiber Based Liquid Molded PA6 Composites", Accepted by ***Journal of Reinforced Plastics and Composites***, July 2018.

- Qiushi Wang, Joydan Jones, Na Lu, Ralph Johnson, Haibin Ning, and Selvum Pillay. "Development and Characterization of High-Performance Kenaf Fiber–HDPE Composites", ***Journal of Reinforced Plastics and Composites***, ***37*** (3): 191–200, 2018.
- Haibin Ning, Selvum Pillay, Balaji Thattai, and Uday Vaidya. "Design and Manufacturing of Long Fiber Thermoplastic Composite Helmet Inserts", ***Composite Structures***, ***168***: 792-797, 2017.
- Theresa Sullins, Selvum Pillay, Alastair Komus and Haibin Ning. "Hemp Fiber Reinforced Polypropylene Composites: Material Treatments", ***Composites Part B: Engineering***, ***114***: 15–22, 2017.
- Qiushi Wang, Haibin Ning, Uday Vaidya, and Selvum Pillay. "Mechanical Behavior of Long Carbon Fiber Reinforced Polyarylamide at Elevated Temperature", ***Journal of Material Sciences and Engineering***, ***5*** (6): 1-6, 2016.
- Qiushi Wang, Haibin Ning, Uday Vaidya, Selvum Pillay, and Leigh-Ann Nolen. "Development of a Carbonization-in-Nitrogen Method for Measuring the Fiber Content of Carbon Fiber Reinforced Thermoset Composites", ***Composites Part A: Applied Science and Manufacturing***, ***73***: 80–84, 2015.
- Alejandra Constante Perez, Selvum Pillay, Haibin Ning, and Uday K Vaidya. "Utilization of Algae Blooms as a Source of Natural Fibers for Biocomposites Materials. Study of Morphology and Mechanical Performance of Lyngbya Fibers", ***Algal Research***, ***12***: 412–420. 2015.
- Qiushi Wang, Haibin Ning, Uday Vaidya, Selvum Pillay, and Leigh-Ann Nolen. "A New Procedure 'Procedure H-Matrix Carbonization in a Nitrogen-Purging Furnace' " is published in American Standards for Testing and Materials, International (ASTM International), ASTM D3171-Standard Test Methods for Constituent Content of Composite Materials, 2015.
- Shubhashini Oza, Haibin Ning, Ian Ferguson, and Na Lu. "Effect of Surface Treatment on Thermal Stability of the Hemp-PLA Composites: Correlation of Activation Energy with Thermal Degradation", ***Composites Part B***, ***67***: 227–232, 2014.
- James Johnston, Haibin Ning, Jong-Eun Kim, Young-Ho Kim, Bharat Soni, Richard Reynolds, Lloyd Cooper, J. Barry Andrews, and Uday Vaidya, "Simulation, Fabrication and Impact Testing of a Novel Football Helmet Padding System that Decreases Rotational Acceleration", ***Sports Engineering***, DOI: 10.1007/s12283-014-0160-4. pp. 1–10. 2014.
- Balaji Thattai, K., Selvum Pillay, Dhruv Bansal, Haibin Ning, and Uday Vaidya. "Processing and Characterization of Continuous Fibre Tapes Co-Moulded With Long Fibre Reinforced Thermoplastics", ***Polymers & Polymer Composites***, ***21*** (8), 483–494, (2013)
- Vaidya, U.K., K.B. Thattai, S. Pillay, S. Vaidya, Haibin Ning, and D. Bansal. "Colored Inorganic-Pigmented Long-Fiber Thermoplastics", ***Journal of Thermoplastic Composite Materials***, Dec. 2013, 1–17.
- L. Roy Xu, Arun Krishnan, Haibin Ning, and Uday Vaidya. "A Seawater Tank Approach to Evaluate the Dynamic Failure and Durability of E-Glass/Vinyl Ester Marine Composites", ***Composites Part B***, ***43***: 2480–2486, 2012.
- Uday Vaidya, Selvum Pillay, Balaji Thattai, and Haibin Ning. "Advanced Reinforced Thermoplastic Composites for Mass Transit and Heavy Truck Applications", ***International Journal of Vehicle Structures & Systems***, ***4*** (3): 92–95, 2012.

Invited Conference Presentations

- Haibin Ning and Na Lu, A new method for measuring fiber content of organic fiber composites, American Standard for Materials and Testing, Seattle, WA, 2018.
- Mohamed M. Selim, Sunil Dhapola, Mahmoud M.A. Ibrahim, Haibin Ning, Selvum Pillay, Recycled composite material for new storm water inlet tops design, Orlando FL, CAMX 2017.

- Mark Janney, Uday Vaidya, Ryan Sutton, and Haibin Ning, Re-grind Study of PPS-Based Long Fiber Thermoplastic Composites, SAMPE conference, Seattle, WA, une 2014.
- Uday Vaidya, Balaji Thattai, Selvum Pillay, and Haibin Ning, Automotive Applications with Cost-Effective and Recycled Thermoplastic Composites, International SAMPE Symposium and Exhibition Proceedings conference, May 21-24, Seattle, WA, 2012.
- Uday Vaidya, Balaji Thattai, Selvum Pillay, Haibin Ning, Thermoplastic Sandwich Composites from Recycled Sources For Impact Damage Tolerance And Crashworthiness, SPE automotive, 12th Annual Automotive, Composites Conference and Exhibition, 2012.
- Uday Vaidya, Balaji Thattai, Selvum Pillay, Haibin Ning, and Dana Grow, Recycled Thermoplastic Composites for Transportation Applications, Society of Plastics Engineers - 11th-Annual Automotive Composites Conference and Exhibition, Automotive Composites Conference and Exhibition, ACCE 2011.
- Uday Vaidya, Balaji Thattai, Dan Kaliberov, Selvum Pillay and Haibin Ning, Recycled Long Fiber Thermoplastic Composites for Transportation Applications. SAMPE Seattle, May 2010.

Graduate Student Advising

- Current students: Garo Trtrian (MS student); Yuchao Shih (MS student); Huaxiu Zeng (PhD student); Yongzhe Yan (PhD student).
- Student graduated: Vikas Patel, PhD, Spring 2018; Qiushi Wang, PhD, May 2015; Pritesh Yeole, MS, May 2015.

Services

- American Society for Materials and Testing (ASTM) D30 committee member since 2012
- Faculty advisor for Society of Plastics Engineers (SPE) since 2013
- Serve as UAB School of Engineering Academic Committee since Aug 2018
- Serve as Undergraduate Program Director for UAB materials science and engineering program since Aug 2018
- UAB Council of Postdoctoral Education since Sept 2018
- Dissertation/thesis committee for 30 graduate students from UAB and University of Alabama
- Reviewer for 15 journals in materials engineering fields
- Editorial board member for 3 journals

Honors and Awards

- ASTM International Professor of the Year Award, 2013
- UAB President's Awards for Excellence in Teaching, 2014
- Outstanding Reviewer for Materials and Design journal, 2015
- American Society of Non-destructive Testing (ASNT) faculty award, 2016

Teaching

- MSE 401/501 - Manufacturing Processes for Engineering Materials (Fall 2017, 2016, 2015, 2014)
- MSE 464/564 - Metals and Alloys (Spring 2018, 2017, 2016, 2015, and Fall 2013)
- MSE 413/513 - Composite Materials (Fall 2016)
- MSE 405/505 - Frontier of Automotive Materials (Summer 2015, Fall 2017)
- MSE 668/768 – Applied Finite Element Analysis (Fall 2015, Summer 2014, Spring 2012)
- MSE 310 - Materials Engineering Laboratory II (Spring 2013)
- Average score from IDEA reviews for all of the courses: 4.5/5

Appendix A – List of Support Letters

Support letter 1: The recycling committee of The American Composites Manufacturers Association (ACMA), the world's largest composite material industry trade group

Support letter 2: Alabama Environmental Council

Support letter 3: McWane Science Center, Birmingham, AL

Support letter 4: Department of Planning, Engineering, and Permits, City of Birmingham

Support letter 5: Alabama Productivity Center, University of Alabama

Support letter 6: Center for Polymers and Advanced Composites, Auburn University

Support letter 7: Tuskegee University

Support letter 8: Troy University

AMERICAN COMPOSITES MANUFACTURERS ASSOCIATION

September 21, 2018

Dr. Haibin Ning
Assistant Professor
UAB Department of Materials Science and Engineering
UAB Materials Processing and Applications Development (MPAD) Center

Dr. Robert W. Peters
Professor, Dept. of Civil, Construction, and Environmental Engineering
University of Alabama at Birmingham (UAB)

Subject: Letter of Interest – Materials Recycling

Drs. Ning and Peters:

The letter is provided to you in strong support of your planning grant entitled "Better Birmingham by Better Recycling" for UAB grand challenge.

Recycling has become a more pressing and urgent need for our communities. With more recycling, we can reduce materials being sent to landfills, protect our environment from pollution, reserve our natural resources for next generations, reduce energy consumption in manufacturing, create for-profit industries and create jobs, and most importantly, improve the quality of life and health for the residents in the City of Birmingham, the State of Alabama and our nation.

The American Composites Manufacturers Association (ACMA) is the world's largest composites industry trade group. It has 465 members, including over 250 manufacturers, 95 material and equipment suppliers, 25 distributors, 55 affiliates from academia and outside organizations. The ACMA recycling Committee was established in 2011 and is dedicated to promoting action and education to enhance the recycling of plastics and composites. We would like to collaborate with University of Alabama at Birmingham on their efforts in recycling materials especially plastics and composites. We plan to participate in the planning grant meeting and collaborated research as appropriate.

Please feel free to contact me should you have any questions.

Yours Sincerely,

Ed Pilpel
Chair
ACMA Recycling Committee
Ed.Pilpel@PolyOne.com

Alabama Environmental Council

A Healthy Alabama for a Sustainable Future

4330 1st Avenue South
Birmingham, Alabama 35222
info@AEConline.org
205.205.7581

www.AEConline.org

September 26, 2018

Dr. Robert W. Peters
Professor, Dept. of Civil, Construction, and Environmental Engineering University of Alabama at Birmingham (UAB)

Dr. Haibin Ning
Assistant Professor of Materials Science
UAB Department of Materials Science and Engineering
UAB Materials Processing and Applications Development (MPAD) Center

Drs. Peters and Ning:

This letter is provided to express strong support of your planning grant for UAB grand challenge. We are grateful that UAB is taking initiative to "Better Birmingham by Better Recycling."

Recycling has become a more pressing and urgent need for our communities. With innovation, we can disrupt outdated processes of waste management by increasing recycling participation rates and turning waste into opportunity. We can divert waste from landfills, protect our environment from pollution, reserve our natural resources for next generations, reduce energy consumption in manufacturing, create for-profit industries and create jobs, and most importantly, improve the quality of life and health for the residents in the City of Birmingham and the State of Alabama.

Alabama Environmental Council (AEC) brings admirable support and much to the table with over 50 years of experience and a strong community following. Our organization started the recycling program in Birmingham over 30 years ago and we continue to fill service gaps that are lacking.

Education and access to information are essential for driving change and collaborative partnerships are vital to flourishing communities. Therefore, education and outreach are at the core of every endeavor we pursue. Initiating education programs and promoting materials recycling activities will be mutually beneficial to UAB and our 501(c)(3) nonprofit. We are very supportive of these initiatives and anticipate participation in the planning meeting and collaborated community efforts.

Please feel free to contact me should you have any questions.

Sincerely,

Felicia Buck
Executive Director
Alabama Environmental Council
Felicia@AEConline.org
C: 205.213.6501

McWane Science Center

September 21, 2018

Dr. Robert W. Peters
Professor, Dept. of Civil, Construction, and Environmental Engineering
University of Alabama at Birmingham (UAB)

Dr. Haibin Ning
Assistant Professor
UAB Department of Materials Science and Engineering
UAB Materials Processing and Applications Development (MPAD) Center

Subject: Letter of Support – Materials Recycling Planning Grant

Drs. Peters and Ning:

The letter is provided to you in strong support of your planning grant entitled "Better Birmingham by Better Recycling" for UAB grand challenge.

Recycling has become a more pressing and urgent need for our communities. With more recycling, we can reduce materials being sent to landfills, protect our environment from pollution, reserve our natural resources for next generations, reduce energy consumption in manufacturing, create for-profit industries and create jobs, and most importantly, improve the quality of life and health for the residents in the City of Birmingham, the State of Alabama.

McWane Science Center is a not-for-profit (501 c-3), science museum located in Birmingham, Alabama. McWane was founded in 1992, and we opened our doors to the public in 1998. Since opening, we have served over 7 million visitors—welcoming an average of 360,000 visitors annually. In addition, we work with schools and other education-based institutions to deliver community-based outreach programs that reach nearly 25,000 children annually. McWane's service base spans all age ranges, races, genders, ethnicities, and socioeconomic statuses. The mission of McWane Science Center is to spark wonder and curiosity about our world through hands-on, science experiences. Our vision is to excite and inspire inquiry and innovation.

MCWANE SCIENCE CENTER
200 19TH STREET NORTH, BIRMINGHAM, AL 35203 • (205) 714-8300 • WWW.MCWANE.ORG

The "Better Birmingham by Better Recycling" grant supports education, research, and science exploration in the field of materials recycling, which aligns with the mission and vision of our Science Center. We support the efforts proposed in the planning grant and plan to participate in the planning meeting and educational programs as appropriate.

Please feel free to contact me should you have any questions.

Yours Sincerely,

Amy Templeton
President and CEO
McWane Science Center

CITY OF BIRMINGHAM

Department of Planning, Engineering & Permits
710 North 20th Street
City Hall | Room 207
Birmingham, Alabama 35203

PUTTING PEOPLE FIRST

RANDALL L. WOODFIN
MAYOR

Edwin Revell
DIRECTOR

Sept 28th, 2018

Dr. Robert Peters
Professor, UAB Dept. of Civil Construction, and Environmental Engineering

Dr. Haibin Ning
Assistant Professor
UAB Department of Materials Science and Engineering
UAB Materials Processing and Applications Development (MPAD) Center

Re: Letter of Support – Materials Recycling

Drs. Peters and Ning:

We offer our strong support of your planning grant entitled "Better Birmingham by Better Recycling" for UAB grand challenge.

Materials recycling has become a more pressing and urgent need for our communities. With more recycling, we can reduce materials being sent to landfills, protect our environment from pollution, reserve our natural resources for next generations, reduce energy consumption in manufacturing, create for-profit industries and create jobs, and most importantly, improve the quality of life and health for the residents in the City of Birmingham and the State of Alabama.

The City of Birmingham Planning, Engineering & Permits Department has been collaborating UAB MPAD Center to develop drainage cover using recycled plastics and recycled glass fibers to replace the current concrete covers. The concrete covers are brittle and have undergone severe damage at many locations due to impact from cars or trucks. This collaborated effort will yield a product with superior impact resistance and low cost using recycled materials. We would like to collaborate with UAB on more projects related to product development using recycled materials which will be a great benefit to our city and communities. We are supportive of the efforts in their education and research of materials recycling and plan to participate in the planning meeting.

Please feel free to contact me should you have any questions.

Sincerely yours,

Direcus Cooper MSEM

Storm Water Specialist
Planning, Engineering & Permits
City of Birmingham
p: 205.254.7771 m: 205.706.8431
f: 205.297.8209
a: 710 North 20th St, Rm 202
Birmingham AL 35203
w: www.birminghamal.gov e: direcus.cooper@birminghamal.gov

PUTTING PEOPLE FIRST

WWW.BIRMINGHAMAL.GOV

Culverhouse
College of Business
Alabama Productivity Center

Sept 20th, 2018

Dr. Robert Peters
Professor, Dept. of Civil Construction, and Environmental Engineering
University of Alabama at Birmingham

Dr. Haibin Ning
Assistant Professor
UAB Department of Materials Science and Engineering
UAB Materials Processing and Applications Development (MPAD) Center

Drs. Peters and Ning:

We offer our strong support of your planning grant entitled "Better Birmingham by Better Recycling" for UAB grand challenge.

Materials recycling has become a more pressing and urgent need for our communities. With more recycling, we can reduce materials being sent to landfills, protect our environment from pollution, reserve our natural resources for next generations, reduce energy consumption in manufacturing, create for-profit industries and create jobs, and most importantly, improve the quality of life and health for the residents in the City of Birmingham and the State of Alabama.

The Alabama Productivity Center is an outreach program for the Culverhouse College of Business at the University of Alabama. Our program is an experiential learning program for university students, not only at the University of Alabama but also UAB. With a focus on supporting our states manufactures, students in our program work on challenging projects that support productivity improvement and sustainability. Our students have worked on recycling projects that not only save our environment, but create value for industry. Projects have included water recycling, repurposing excess process materials and energy efficiency improvements. These projects show students who are soon to enter the workforce that recycling can add to the profitability of industry and create a better environment for future generations. The "Better Birmingham by Better Recycling" grant supports education and research in field of recycling, and would be a tremendous value to programs like ours and our industry partners. We support the efforts proposed in the planning grant and plan to participate in the planning meeting.

Please feel free to contact me should you have any questions.

Sincerely yours,

Alan Hill
Executive Director
Alabama Productivity Center
Culverhouse College of Business

1818 UNIVERSITY BLVD., BOX 870318 • TUSCALOOSA, AL 35401 • MAIN OFFICE (205) 348-8956
THE UNIVERSITY OF ALABAMA®

AUBURN
UNIVERSITY

Samuel Ginn College of Engineering

Department of Chemical Engineering

September 17th, 2018.

Dr. Robert W. Peters
Professor, Dept. of Civil, Construction, and Environmental Engineering
University of Alabama at Birmingham (UAB)

Dr. Haibin Ning
Assistant Professor of Materials Science
UAB Department of Materials Science and Engineering
UAB Materials Processing and Applications Development (MPAD) Center

Drs. Peters and Ning:

The letter is provided to you in strong support of your planning grant entitled "Better Birmingham by Better Recycling" for UAB grand challenge.

Recycling has become a more pressing and urgent need for our communities. With more recycling, we can reduce materials being sent to landfills, protect our environment from pollution, reserve our natural resources for next generations, reduce energy consumption in manufacturing, create for-profit industries and create jobs, and most importantly, improve the quality of life and health for the residents in the City of Birmingham and the State of Alabama.

Recycling of polymeric materials and research in recycled polymer and its composites are areas of strategic importance to our center and the collaboration between Center for Polymer and Advanced Composites and UAB MPAD Center is something we see a need for and could be a great benefit to both of our centers

We are supportive of these efforts and plan to participate in the planning meeting and collaborated research as appropriate.

Please feel free to contact me should you have any questions.

Yours Sincerely,

212 Ross Hall
Auburn, AL 36849-5127

Telephone:
334-844-4827

FAX:
334-844-2063

www.auburn.edu

Maria L. Auad, PhD
Director Professor, Center for Polymers and Advanced Composites (CPAC)
Department of Chemical Engineering
320 Ross Hall
Auburn University, AL 36849-5127
Direct 334.844.5459
Fax 334.844.2063

TUSKEGEE UNIVERSITY

COLLEGE OF ENGINEERING
Department of Materials Science and Engineering

Sept 21th, 2018

Dr. Robert Peters
Professor, UAB Dept. of Civil Construction, and Environmental Engineering

Dr. Haibin Ning
Assistant Professor
UAB Department of Materials Science and Engineering
UAB Materials Processing and Applications Development (MPAD) Center

Re: Letter of Support – Materials Recycling

Drs. Peters and Ning:
We offer our strong support for your planning grant entitled "Better Birmingham by Better Recycling" for UAB grand challenge.

Materials recycling has become a more pressing and urgent need for our communities. With more recycling, we can reduce materials being sent to landfills, protect our environment from pollution, reserve our natural resources for next generations, reduce energy consumption in manufacturing, create for-profit industries and create jobs, and most importantly, improve the quality of life and health for the residents in the City of Birmingham and the State of Alabama.

The Materials Science and Engineering (MSE) Department at Tuskegee University has been performing education and research on recycling polymeric materials over the last eight years jointly with the Department of MSE at UAB. The continuation of our collaboration through this pioneered planning grant would be a great benefit to our efforts and organizations. Therefore, we are fully supportive of the efforts in the education and research of materials recycling, and plan to participate in the planning meeting to help in the launch of this program.

Please feel free to contact me at 334-7244222/ szainuddin@tuskegee.edu should you have any questions.

Sincerely,

Shaik Zainuddin, Ph.D.
Associate Professor, MSE

College of Arts and Sciences

115 McCall Hall
Troy, Alabama
36082

334-670-3399/5926
334-670-3673 FAX

September 21, 2018

Dr. Haibin Ning
Assistant Professor
UAB Department of Materials Science and Engineering
UAB Materials Processing and Applications Development (MPAD) Center

Dr. Robert Peters
Professor, UAB Dept. of Civil Construction, and Environmental Engineering

Drs. Ning and Peters:

TROY UNIVERSITY

We offer our strong support of your planning grant entitled "Better Birmingham by Better Recycling" for UAB grand challenge.

Materials recycling has become a more pressing and urgent need for our communities. With more recycling, we can reduce materials being sent to landfills, protect our environment from pollution, reserve our natural resources for next generations, reduce energy consumption in manufacturing, create for-profit industries and create jobs, and most importantly, improve the quality of life and health for the residents in the City of Birmingham and the State of Alabama.

Troy University is in a process of developing a Center for Materials and Manufacturing Sciences and materials recycling is one of our research priorities. Therefore, recycling of plastic/polymer materials and education and research in that field are of significant importance to us and the collaboration between UAB and our Center would be a great benefit to our organization. We are supportive of the efforts in the education and research of materials recycling and plan to participate in the planning meeting to help in the launch of this program.

Please feel free to contact me should you have any questions.

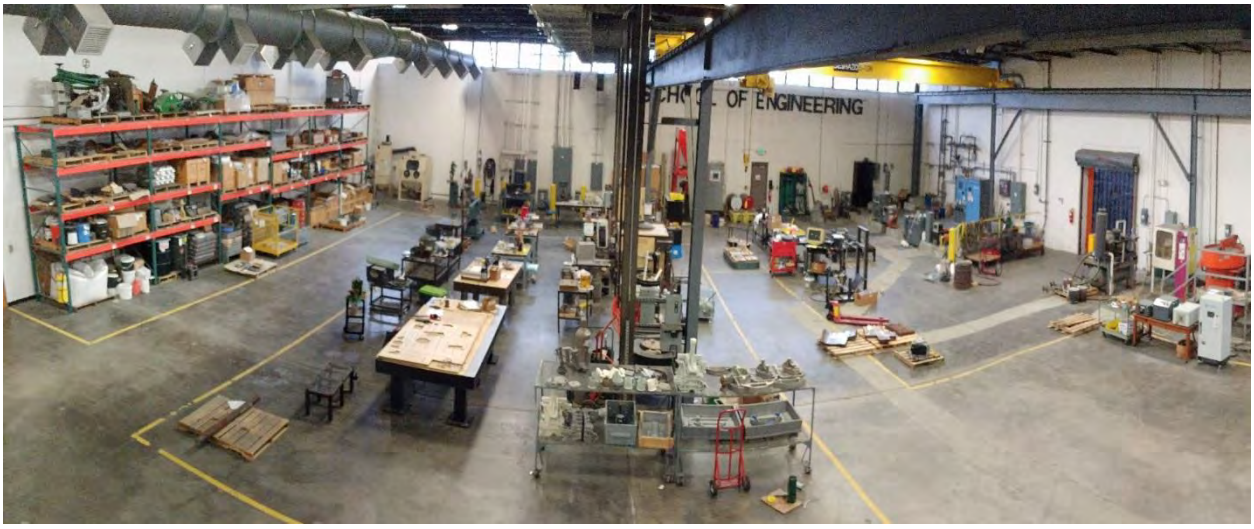
Sincerely yours,

Steven L. Taylor, Ph.D.
Dean, College of Arts & Sciences
Troy University

Appendix B – Facility for Materials Recycling at UAB School of Engineering

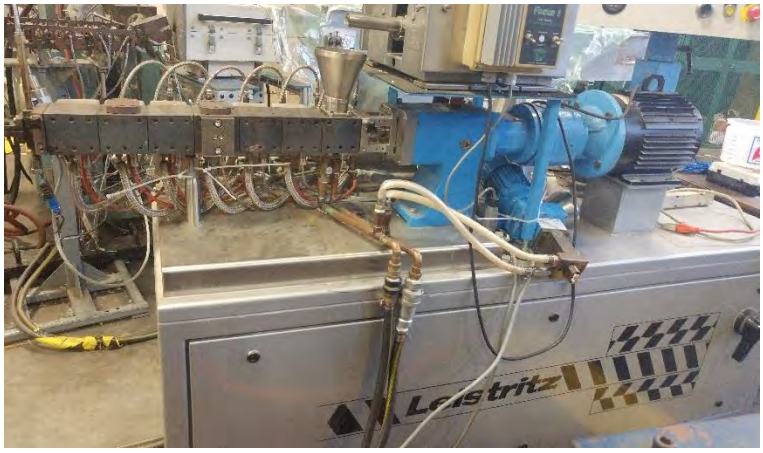
Materials Processing and Applications Development (MPAD) Center at UAB School of Engineering has a significant effort in the research and development of advanced materials focusing on lightweight engineered plastics, fiber reinforced plastic composites, and metal casting for automotive, transportation, medical, military, aerospace, energy and other applications. Research and development work on recycled materials such as plastics, plastic based composites, and metallic materials have been extensively carried out in the Center. The research team has strong ongoing multi-institutional collaborations involving universities, national laboratories, other organizations, and small businesses. The figures below highlight the facility and main equipment at the UAB MPAD Center that has a space of 30,000 ft^2.

Panorama view of the UAB MPAD Center – Engineered Plastics and Composites Facility



Panorama view of the UAB MPAD Center – Metal Casting Facility

250 Ton compression molding press



Leistritz twin screw extruder

50 kip MTS frame

Single screw extruder

Lawton low shear plasticator

350 Ton hydraulic press

Low shear single screw extruder

Thermoplastic pultrusion line

Environmental chamber

Optical microscopy

VHX confocal microscope

Taber wear tester

G200 Nanoindenter

Ultraviolet chamber