



Annual Report

Prepared by: University of Puerto Rico – Material Advantage Student Chapter
Academic year: 2017 - 2018
Date: August 15, 2018

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CHAPTER OVERVIEW

2017-2018 Highlights

The University of Puerto Rico – Mayagüez (UPRM) hosts our Material Advantage-UPRM Chapter (MaAd), which proudly is the only student chapter in Puerto Rico and the Caribbean devoted to educate and cultivate the interest in students in Materials Science and Engineering (MSE). Since its foundation in 2004, our chapter has provided resources and activities for the professional development of our members as well as middle and high school students. On September 20, 2017 our island was devastated after the passage of Hurricane Maria. However, as noted in this report, this natural disaster could not prevent us from continuing serving our community.

Three (3) times Chapter of Excellence Award winner

- 2006-2007
- 2013-2014
- 2014-2015

Forty (40) active graduate and undergraduate members

Career Development

- 5 professional development workshops and info sessions
- Technical meetings and conferences participation
 - 1 student at SACNAS (Poster presentation award in the engineering division)
 - 4 students at TMS (1st place in the Structural Materials Division)
 - 4 students at PRISM
 - 3 student at Sigma Xi

Outreach activities

- 4 middle and high school activities
- 1 Nanoday activity
- 1 Material Advantage Bulldogs Camp

2017-2018 CHAPTER OFFICERS



Mónica A. Díaz
Chair



Amanda Quintero
Vice-Chair



Ángel G. Torres
Secretary



Claralys Hernández
Treasurer



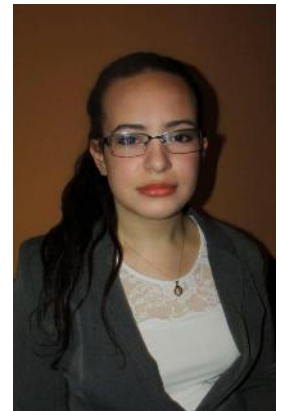
Hildelix Soto
Outreach Coordinator
September-December
2017



Julie A. Colón
Outreach Coordinator
January-May 2018



Raúl J. Vega
Fundraising
Coordinator



Cristina M. Crespo
Public Relations

PROGRAMMING

During the academic year our chapter programmed activities to fulfill our mission. All the activities were devoted to material sciences and research education, and professional and leadership development.

“Facilitate access to opportunities in the field of Materials Science and Engineering (MSE) to all students in our Campus, and to foster awareness on MSE throughout the entire University as well as in local private and public schools and nearby communities.”

-Material Advantage-UPRM Chapter mission

MaAd Nanoday Celebration

This year our chapter organized for the first time the MaAd Nanoday Celebration as part of the National Day of Nanotechnology. This activity was intended to be on October 9, however, due to hurricane Maria, it was rescheduled for December 16, 2017. This activity was carried out in the facilities of the Art Museum and headquarters of the Academic Senate (MUSA for its Spanish acronym) of our university. About 80 participants, including 7th-12th grade students, their parents and teachers, took part of interactive demonstrations and lectures on nanotechnology. In this endeavor we were assisted by the Nanotechnology Center for Biomedical and Sustainability Applications (supported by the NSF CREST program) and the American Society of Civil Engineers (ASCE) student chapter. The participants also learned more about engineering through a workshop that explained the different engineering fields offered by our university.

Material Advantage Bulldogs Camp

For the fourth year in a row our Chapter took on the challenge to prepare a one-day camp for high school students. The students soliciting to partake in the camp were required to submit a personal statement on their goals in terms of education. Throughout the day, we provided them with workshops, exciting challenges, laboratory tours, talks on university life and interactive demonstrations related to science, technology, engineering; as well as 2-hour research projects for the division of groups: ceramics, polymers, metals, plastics and piezoelectric materials. Also, their parents were oriented by UPRM professional counselor, Dr. María Almodóvar, on how to prepare their daughters and sons for their forthcoming transition to college lifestyle. From those 47 students we welcomed, three students, and their parents, from the small islands of Vieques and Culebra, were able to participate for the first time due to a grant from the Ceramic & Glass Industry Foundation. At the end of the camp, the students proved that the mission had been achieved by group presentations.

Seminars and Workshops

As part of the professional development activities, our chapter offered to UPRM students a series of seminars on varied topics. These activities provided resources for the development of leadership skills and prepare them for the future. As part of our campus career week, we coordinated the visit of former members of our chapter who shared their experiences as well as demonstrated their gratitude to the chapter for giving them the skills necessary to obtain job opportunities in prestigious companies such as Boeing.

CAREER DEVELOPMENT

Our chapter is greatly committed to provide the resources for the professional development of our members and students. Through several activities, they acquire soft skills and in-depth insights and tips for their future careers. Through a wealth of opportunities like workshops, assistance to scientific conferences, posters and oral competitions, among others, the students develop a variety of skills that will help them throughout their profession.

Technical Meeting Participation

SACNAS National Diversity in STEM Conference – October 2017

- Salt Lake City, Utah
- 1 member presented her poster
- She won the first prize in the general engineering division

The Minerals, Metals and Materials Society (TMS) Annual Meeting – March 2018

- Phoenix, Arizona
- 4 members of MaAd-UPRM presented their work in the conference
- 1 student won the first place in the Structural Materials Division

Puerto Rico Interdisciplinary Scientific Annual Meeting (PRISM) – April 2018

- Turabo University – Gurabo, PR
- 4 members presented their work in the scientific meeting.

Sigma Xi Poster Day – May 2018

- Chemistry Building, UPRM – Mayagüez, PR
- 1 member presented its work in the interdisciplinary scientific meeting.



Figure 1. Yamalis Lopez Massa, winner of the Undergraduate Poster presentation in the General Engineering Division and the team that helped her.

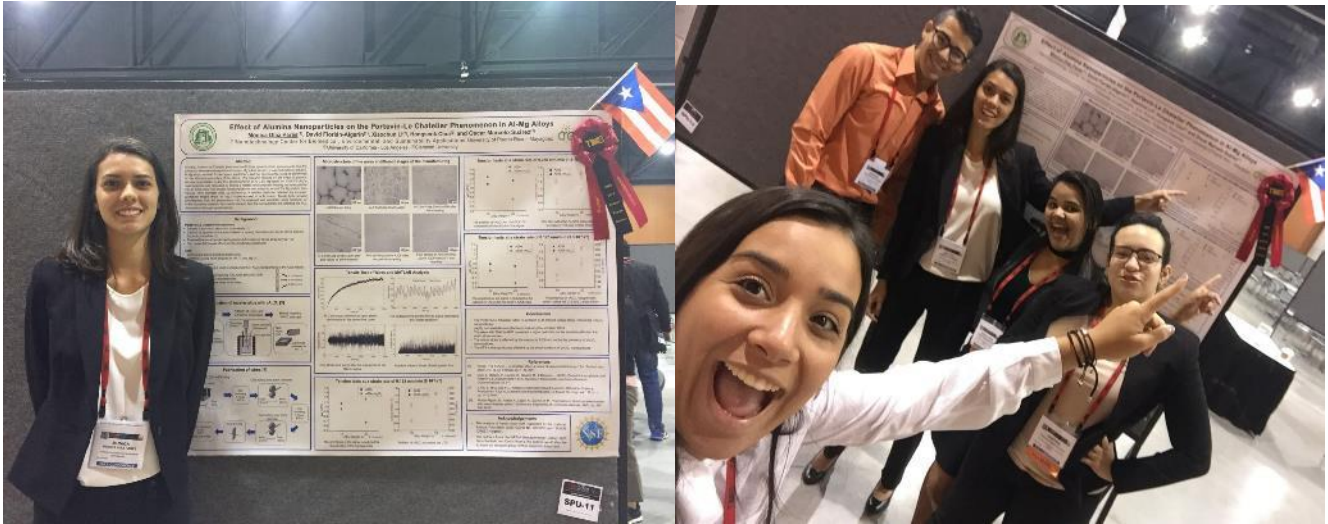


Figure 2. Monica Diaz Pares, our president, winner of the Undergraduate Poster presentation in Structural Materials Division of TMS and the MaAd team in the conference.

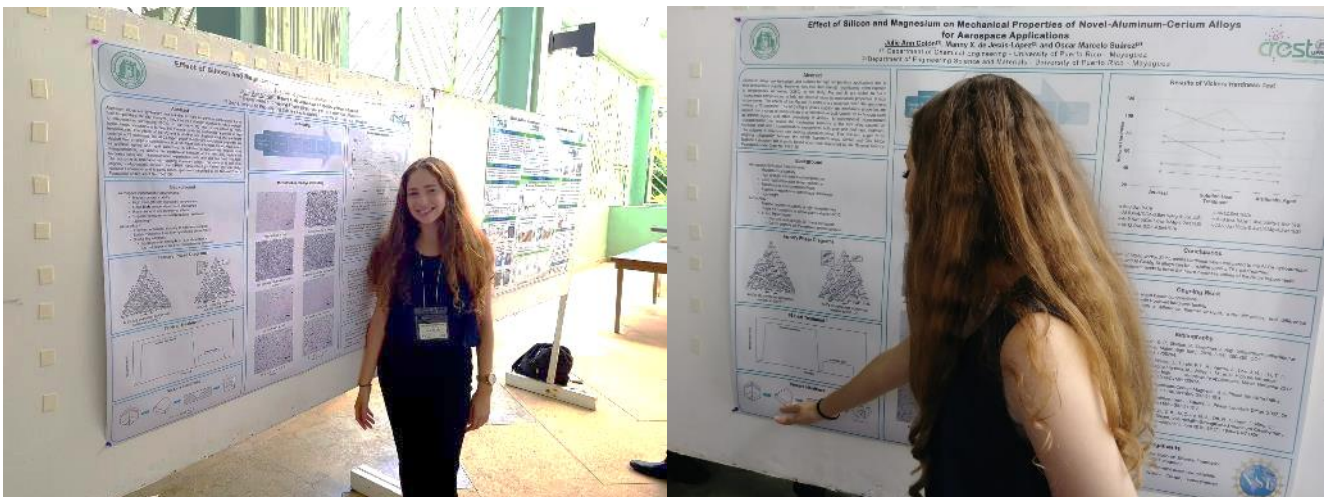


Figure 3. Julie Colon, Outreach Coordinator, presenting in the Sigma Xi poster presentation.

Others Career Development Activities

Seminars and Workshops

Federal Fellowships for Graduate School- November 2017

Presenters: Profs. O. Marcelo Suárez and Eduardo Ortiz

- University of Puerto Rico – Mayaguez Campus
- This seminar provided students with the information necessary in order to apply to different scholarships that would support their graduate studies and research projects.

“Data Presentation”: The Do’s and Don’ts of Figures, Plots, and Images – November 2017

Presenter: Prof. O. Marcelo Suárez

- University of Puerto Rico – Mayaguez Campus
- This workshop addressed the gray areas left by those guidelines and specificities about figures scientific charts, and plots.

Grad School Workshop – November 2017

Presenter: Prof. O. Marcelo Suárez

- University of Puerto Rico – Mayaguez Campus
- This workshop unveiled what an undergraduate student can expect from graduate school. The presenter gave a summary of the steps to follow to apply and answered the most common questions that arise after having already been accepted into a graduate engineering program.

Systems Engineering at Boeing – February 2018

Presenters: Eng. Luis Laracuente and Eng. Lourdes Cruz

- University of Puerto Rico – Mayaguez Campus
- Previous members of our chapter instructed our members on their day to day tasks as System Engineers at Boeing. After explaining their profession, they did not left any question from our members unanswered and also assured them that our chapter had an important part to play into why they are currently working at Boeing.

Building a Human Size Robot at Home – May 2018

Presenter: Eng. Alexis Paris

- University of Puerto Rico – Mayaguez Campus
- In this workshop Eng. Alexis Paris showed his experience in building a homemade manufacture of a human-sized robot.



Figure 4. On the left, the chapter officers with Eng. Luis Laracuente and Eng. Lourdes Cruz of the workshop “Engineering at Boeing”. On the right, our intrigued members paying close attention to our workshop on how to build a robot.

SERVICE

Outreach Activities

To our Chapter outreach activities are essential in the development of our members and to motivate our university and local community to become engaged in the Materials Science and Engineering field. Our goals with these activities have been:

- To engage students in middle and high schools into considering a career path in Materials Science in our university or other higher education institutions.
- To introduce the general community to materials science and engineering with engaging activities demonstrating the impact of materials science on the development of society.

We have been able to complete many of these activities via a strategic partnership with our university's CREST Center and other interdisciplinary student chapters.

MaAd Nanoday Celebration - December 2017

On December 16, our chapter organized the MaAd Nanoday Celebration for the first time. This activity took place in the Museum of Art (MUSA) of our campus for four hours. There, we received about 80 people, including middle and high school students, along with some of their parents and teachers. All students had the experience of participating in interactive demonstrations on nanotechnology, receiving talks and learning about some of the current research work of our students. In this activity we had the collaboration and participation of the Nanotechnology Center and the American Society of Civil Engineers (ASCE).



Figure 5. MaAd officers and members giving nanotechnology demonstrations to our first Nanoday Celebration participants.



Figure 6. Mónica Díaz Pares, MaAd Chairperson, welcoming all the participants.

MaAd Bulldogs Camp – April 2018

For the past four years the MaAd Bulldogs Camp has become the top activity of our student chapter. The main objective of this one day camp has been to expose all participant students (9th to 12th grade) to the exciting challenges related to science, technology, engineering, and mathematics (STEM) with an emphasis in materials.

This year we received 47 students from around the island including 3 students from the small islands of Vieques and Culebra. In addition, we had funds granted by the Ceramic and Glass Industry Foundation (CGIF) which helped to lower the travel expenses of students from the most remote areas of the island. In addition, the collaboration of the Nanotechnology Center and ASCE, as well as around 25 members and volunteers.

Planning and Execution

To disseminate the opportunity to partake in the camp, we used a number of outreaching strategies via flyers or electronic media:

- Information table during the UPRM Engineering open house (February 2018), providing information about the camp to visitors and collecting email addresses of potential applicants.
- Email using UPRM email distribution lists to high schools in Puerto Rico
- Announcements in UPRM Materials Engineering courses to disseminate the opportunity
- Announcement in the MaAd Facebook page
- MaAd members' visits to schools
- 2017 *Puerto Rico STEM's Up to the Challenge* activity

In addition, we contacted Mr. Josuán Aloyo Corsino, Director of the Vieques Educational District who made the connection with the principals of two public high schools in the islands of Culebra and Vieques. In this case, a brief video promoting the camp was distributed to those contact persons. They distributed the information and selected three students (two from Culebra and one from Vieques). This particular selection was critical as those participants would receive transportation and housing for them and an accompanying adult. Since prior studies demonstrated that less than half of Puerto Rico municipalities are properly represented in the UPRM student body, our advisor and officers placed particular emphasis on demographics, such as average household income and unemployment rate in the different municipalities. The required applicants' package included:

- Evidence of being a 9th to 12th grade regular student
- Evidence of GPA higher than 3.0
- Interest in STEM demonstrated via a personal statement
- Letter of recommendation from a cognizant teacher
- Approval form filled out by a parent or tutor

Nearly 100 high schoolers from different Puerto Rican municipalities submitted their application packages (mostly by email) to partake in the camp. The selection of the Bulldog Camp cohort was carried out by our officers. Each student from more than 40 miles away from Mayagüez received a small travel grant to partly defray ground transportation costs. All students were required to be accompanied by a responsible adult, parent or tutor.



Figure 7. Amanda Quintero (left), MaAd Vicechair, and Mónica Díaz, MaAd Chair, welcome students and parents to the Bulldog Camp.

The one-day camp was divided into a morning session and an afternoon one. In the morning, participants and their parents were welcome by the Associate Dean of Academic Affairs of Engineering, our advisor, and our chairperson. Everyone was instructed on the schedule and goals of the camp. As the participants were divided into five groups, their parents partook in an informal talk with our advisor about what their children should expect from a college life in Mayagüez. Afterwards, they were invited to explore the campus on their own, with a map provided by the organizers. Meanwhile, the camp participants visited several labs including one dedicated to pharmaceutical research and the Civil Engineering Materials one. Our members and volunteers presented several demonstrations on MSE using ceramics kits donated by CGIF.

The five teams then headed to different rooms and laboratories in the Civil Engineering Building where most of the activities took place and one MSE research laboratory in the main Engineering Building (Stéfani Bldg.). Each team worked on high-impact, short experiments related to advanced concrete mixtures, electronic materials, new alloys, and modern polymers. All of those experiments were related to research work currently conducted at UPRM. The overall goal was to demonstrate the camp participants how they could be involved in any of those projects once they have become college students at UPRM.

During the afternoon session, all parents attended a seminar provided by Dr. María Almodóvar, UPRM professional counselor, on admission trends and requirements of UPRM Engineering programs. Prof. Sonia Bartolomei provided specific information of minimum requirements of each undergraduate program. In addition, important aspects of the R²DEEP (Recruitment, Retention, and Distance Engineering Education Project) initiative were discussed. R²DEEP provides a mechanism to attain college credits to high school students so as to shorten their college education. Thus, high schoolers can enroll in introductory courses such as Calculus, Advanced Spanish, Engineering Graphics, among others. These courses are then taught via online or hybrid strategies.



Figure 8. Prof. Sonia Bartolomei (Industrial Engineering) offers the participants an overview of admission statistics and challenges of UPRM Engineering programs.



Figure 9. Participating parents were oriented by Dr. María Almodóvar about the challenges of the admission process, costs of college education, and other related topics.

Parents and students were then reconvened at the Civil Engineering Amphitheater for the concluding event: a presentation by each team about their learned concepts. We wanted to provide a challenging yet enriching venue to the youth: a place to discuss their experiences in front of their family and new acquaintances. Thus, we were able to evaluate content rather than assessing satisfaction. The effectiveness of the learning was evinced by the participants' presentations.



Figure 10. One of the presentations by the Bulldog participants on the materials they learned about during the one-day event.



Figure 11. MaAd officers and the PI (all in blue) were particularly grateful to the three participants from the small islands of Vieques and Culebra.



Figure 12. Our brave Bull Dog Camp participants, the future of Puerto Rico Engineering.

Other Outreach Activities

UPRM Engineering Open House - February 2018

Several schools from all over the Island were represented in this activity in which our chapter had a table full of demonstrations. We satisfied the curiosity of more than 100 students as they partook in our fun demonstrations. Our goals were to motivate them to stay our university as well as to recruit new members. In addition, this activity was used as a platform to inform students of our upcoming Bulldog Camp.

2018 Puerto Rico STEM's Up to the Challenge – March 2018

This year we were invited to participate in this activity on behalf of the Engineering Science and Materials Department, our host department. We were the only UPRM student association to partake in this activity. Around 300 middle and high school students from the island of Puerto Rico were impacted. We provided information about the UPRM engineering programs and conducted demonstrations on MSE.



Figure 13. MaAd members during the 2018 STEM's Up to the Challenge.

Community Service

Our chapter is also proud to participate every year in community initiatives that contribute to the personal development of our members.

Participation in the Relief Efforts after Hurricane María

Figure 13 shows the last meteorological radar image of the hurricane right before that radar located in the mountains of Cayey was destroyed. The storm crossed the island from Southeast to Northwest leaving most of the inhabitants without electricity, communications, and even food. Our campus, in the Western city of Mayagüez was spared from the worst destruction. Yet the hills surrounding the city were severely affected by the wind, the intense rain, and mudslides isolating entire communities.

A few days after the storm, as our campus opened in precarious conditions, MaAd members joined UPRM Nanotechnology Center personnel, including MaAd mentor to distribute bottled water and military rations in the most affected neighborhoods in the Mayagüez municipality. Assisted by the National Guard, we visited communities where many elderly people lived to provide them with supplies. To this purpose, using personal vehicles and the *Nanomobile*, a rugged SUV used by the Nanotechnology Center in their outreach endeavors (Figure 14) during several weeks we partook in these humanitarian initiatives. Ignored (and even derided) by the federal government, it was up to us Puerto Ricans to join forces and stand up and coordinate recovery efforts through spontaneous acts of solidarity.

Our members also participated in collecting donations intended to be distributed in local public schools that became virtual relief centers in the Mayagüez hills. Figure 15 shows our former Outreach Coordinator, Hildélix Soto sorting some of the donations provided by our generous university community. After graduating with a Master of Science degree in Civil Engineering last February she joined FEMA and continues her community involvement.

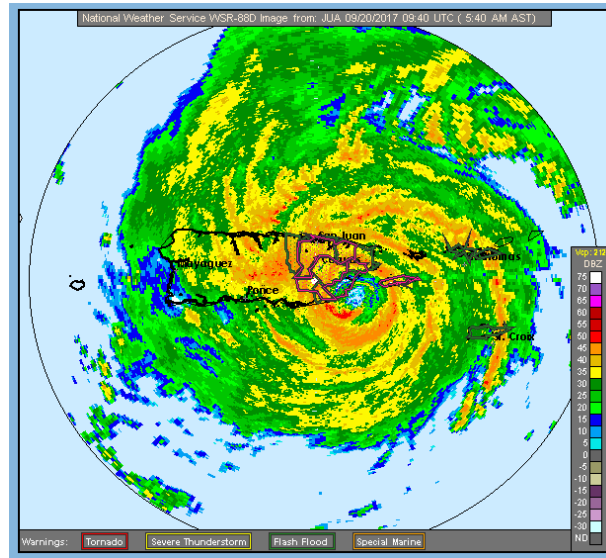


Figure 13. The eye of the Category 5 hurricane is touching down near Naguabo, Puerto Rico.



Figure 14. The *Nanomobile* is filled with supplies before visiting the most affected communities in Mayagüez



Figure 15. Our former outreach coordinator, Hildélix Soto sorts clothes donated by the UPRM community.

SOCIAL ACTIVITIES

Meet Material Advantage – UPRM Chapter Info Table

During the school year, we staffed a table in the lobby of the Stéfani Building (the main Engineering Building) to promote our Chapter and invite student to get involve in our activities.



Figure 16. MaAd officers at their first Nacho sale and info table.

End of the Year Celebration Dinner – May 2018

Our chapter organized this dinner to celebrate all our 2017-2018 achievements and recognize those members and collaborators who helped us during this year.



Figure 17. MaAd members and officers at the Celebration Dinner.

CHAPTER MANAGEMENT

To be able to accomplish our mission and vision, our Chapter has implemented a management system to plan every event we have held. Keeping an annual record of the activities is a foremost requirement as well as training our incoming officers to provide consistency to the reports. At the same time, this system gives us an overview of what we have accomplished and what we wish to accomplish in the years to come. Our Chapter strongly believes in developing future leaders and a well-established organization that allows us to sustain the success of our Chapter.



Chapter Organization and Procedure

Monthly General Meeting

This meeting has been held during from 10:30 am to noon on either Tuesday or Thursday. The executive committee provides an update of the organization status and about upcoming events and engages the general membership in the planning and development of those events. Also, suggestions to new activities are presented and discussed during these meetings.

Weekly Officers Meetings

Every Wednesday the officers meet to plan, organize, and carry out other ancillary chapter activities. They develop from the bottom up new fundraising activities, outreach events, career development activities, social events, and prepare new proposal to obtain additional funding. During these meetings, they discuss not only issues related to the Chapter but also issues related to the four main national organizations, constituents of Material Advantage.

Elections

Each year our chapter holds a nomination process during a general meeting where members can nominate and become nominated to any officer position. If the member accepts the nomination he or she must present a little talk providing the reason why the nomination is accepted. The votes are made electronically and only members have access to the voting process.

Officer's Duties

Chairperson

The president or chair person is ultimately responsible for all chapter activities. He or she interacts with the national organizations and the College of Engineering to which the chapter is ascribed. He or she must coordinate and delegate responsibilities in writing proposals and soliciting additional funding.

Vice-Chair

He or she must assist the president or in the absence of the Chair he or she must assume the position. Duties include planning outreach activities as well as help the Chair in writing proposals and soliciting additional funding.

Secretary

In addition to keeping a written record of activities and meeting minutes, the secretary must send via e-mails the minutes to the members. The secretary must maintain a detailed record of all the activities.

Treasures

The treasurer maintains petty cash and takes care of deposits from every fundraiser. He or she assists with preparing funding proposals and helps to prepare an annual budget and then adjusts the budget accordingly as the year progresses. Also, the treasurer must keep record of every transaction in our university account as well as a record of all scholarships received by the members.

Public Relations Officer

In addition to keeping our bulletin board and our Facebook page updated the public relations officer must follow the university instructions to reserve meeting rooms where our activities will be held as well as to prepare the promotion of all public activities of the Chapter.

Outreach Coordinator

In charge of organizing and keeping track of every outreach activity held by the Chapter and inform of any aid needed in order to fulfill the steps needed to carry out the activity.

Fundraising Coordinator

In charge of organizing all Chapter fundraising activities. It is in charge of finding and proposing innovative ideas to raise funds for the Chapter.

Fundraising and Chapter Grants

Fundraisers and grants are great means to obtain additional funds to help defray our activities. This allows us to invest more on our events and to have a better quality of materials for the different activities that are carried out in our outreach efforts. Fundraisers have helped us greatly to complete the money needed to purchase equipment and materials used in the different activities organized and the clubs offered to schools. Likewise, these helps us pay for

many of the trips to local and international competitions as other necessities that come with this like: food, posters, among other materials needed for these different events. Shown below there are the different grants and fundraising activities that took place in 2017-2018.

UPRM Zombie T-Shirts

In TMS 2014, our members wore t-shirt that read “Zo” (for the *zombie* element) and resembled an element from the periodic table. Through modifications in the back, which made the t-shirt exclusive to MA-UPRM members, the t-shirt was made for our alumni, bearing the college motto “Antes, Ahora y Siempre...COLEGIO!”, i.e. Spanish for “Before, Now, and Always... COLEGIO!” The t-shirt has become so popular that it is now a permanent part of our fundraising. It has brought more than \$500 for further Chapter activities each year.

Ceramic and Glass Industry Foundation Grant (CGIF)

The CGIF awarded us a grant of \$2,600 and a ceramic demonstrations kit as part of a project proposal titled “Engaging Hispanic High School Students in Ceramics and Glass Science and Engineering”. The money granted was used to fulfill the expenses of the Bulldog Camp 2018.

Food and drinks sales

Through the academic year, we had *nachos*, *piña colada*, popsicles and pizza sales rising up more than \$600.

ADVISOR LETTER OF SUPPORT

University of Puerto Rico - Mayagüez

Nanotechnology Center for Biomedical, Environmental and Sustainability
Applications - Phase II



P.O. Box 9000, Mayagüez, Puerto Rico 00681
Phone (787) 832-4040, Ext. 5812, 3504 | Fax: (787) 833-1190 | crest@uprm.edu



August 13, 2018

Drew Fleming
Material Advantage Student Chapter Program
ASM International
9639 Kinsman Road
Materials Park, Ohio 44073-0002

Dear Mr. Fleming:

The main purpose of this letter is to state that the attached information provided for the *Student Chapter of Excellence Program* report by the University of Puerto Rico – Mayagüez Chapter of Material Advantage is thorough, truthful, and representative of the endeavors of our brave student organization. The annual report presents activities and experiences of our chapter from August 20, 2017 through June 10, 2018.

Moreover, I was present in most of the reported events and, thus, I can authenticate the commitment shown by the chapter members and their relentless effort that facilitated the success of all said activities. The chapter was particularly successful in their involvement in outreach activities where our chapter members helped foster the synergy between the chapter and our NSF-funded Nanotechnology Center. The broader impact is reflected by the Chapter's undertakings involving schools serving low-income sectors in Puerto Rico, e.g. the reported one-day *Bulldog Camp* (funded by the Ceramic & Glass Industry Foundation). This social context has been the driving force to motivate our members to engage those young minds into engineering and, eventually, to consider an advanced education in areas related to materials. Further, as indicated in the enclosed report, our Chapter members received several awards that manifest their strong background in Materials Science.

At this point, I must underscore the spirit of this outstanding group of Puerto Rican students. As you know, Hurricane María devastated our island on September 20, 2018, a day that will be forever remembered by these young minds. As our members come from all over the island, everyone was affected by this hecatomb, triggered undoubtedly by global warming. Puerto Rico was slashed from the Southeast to the Northwest by the storm. The dire aftermath brought out the best of these people, their courage, their solidarity, their compassion, the empathy. This disgrace helped me realize how these outstanding human qualities were lacking in my fellow American citizens and the federal government, which continues castigating us through unfair laws and oblivion. Yet, here we are, standing tall and stronger than ever.

The annual report left out those small stories of heroism, of sacrifice of these young students assisting their families and their communities without any hope of a prompt relief from the authorities (local and federal). Through my long conversations with our members, I learned of grandmothers unwilling to leave their homes despite their inhabitability, of brothers and sisters scared of the wind and the floods, of parents without water or electricity for many months, of neighbors passing away without proper health care, of collapsed bridges leaving thousands isolated. This island deserves better, much better from the mainland. Thus, our members deserve being recognized by Material Advantage for their commitment, their sense of community, their compassion.

I urge you to take these words into consideration when you decide about your Chapter of Excellence award. Here is the true “home of the brave” that we all sing proudly about.

In closing, our Material Advantage – Mayagüez Chapter has my full support for the next year to continue realizing remarkable, high impact projects and events. If you require any additional information regarding this letter, please do not hesitate to contact me at your earliest convenience.

Sincerely,

O. Marcelo Suárez, PhD, Fellow of ASM International
Material Advantage Chapter Faculty Mentor
Materials Science & Engineering Graduate Program Coordinator
NSF/UPRM Nanotechnology Center Director
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