

# The University of New Mexico SPIE Student Chapter Annual Report

December 2017



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## Introduction

The University of New Mexico's SPIE student chapter is proud to report its 2017 achievements, as well as its plans for 2018. Our chapter's headquarters are in the Center for High Technology Materials (CHTM) in UNM's Science and Technology Park. CHTM is a wonderful home for our chapter as its interdisciplinary research projects in optics, optoelectronics, materials engineering, physics, chemical engineering, electrical engineering, and other disciplines attract a variety of students from all over the world.

The mission of our chapter has been to advance light based technologies and help support its associated community through participation and organization of activities such as seminars, outreach projects, and social events. We are passionate in our pursuit of nurturing interest in science in young minds. Our aim is to nurture intellectual, communal and professional growth in each of our members, through seminars and networking opportunities. SPIE provides our members a network on a global scale.

### 1. Chapter Officers

#### **October 2016 – December 2016**

President: Vinita Dahiya- [vdahiya22@unm.edu](mailto:vdahiya22@unm.edu)  
Vice President: Lilian Casias - [lkacosta@unm.edu](mailto:lkacosta@unm.edu)  
Secretary: Zahra Taghipour – [ztaghipour@unm.edu](mailto:ztaghipour@unm.edu)  
Treasurer: Clark Kadlec - [clarkkadlec@gmail.com](mailto:clarkkadlec@gmail.com)

Chapter Advisor: Dr. Sanjay Krishna – [skrishna@chtm.unm.edu](mailto:skrishna@chtm.unm.edu)

#### **January 2017 – December 2017**

President: Zahra Taghipour - [ztaghipour@unm.edu](mailto:ztaghipour@unm.edu)  
Vice President: Lilian Casias - [lkacosta@unm.edu](mailto:lkacosta@unm.edu)  
Secretary: Kevin Reilly- [kjreilly@unm.edu](mailto:kjreilly@unm.edu)  
Treasurer: Noel Dawson- [ndawson1@unm.edu](mailto:ndawson1@unm.edu)

Chapter Advisor: Dr. Ganesh Balakrishnan – [gunny@unm.edu](mailto:gunny@unm.edu)

## 2. Members

<b>Name</b>	<b>Expires</b>
<u>Sadhvikas Addamane</u>	16 May 2018
<u>Mohammadreza Ghasemkhani</u>	9 July 2018
<u>Md. Mottaleb Hossain</u>	2 May 2018
<u>Clark Kadlec</u>	18 July 2018
Abu Farzan Mitul	4 June 2018
<u>Mohsen Nami</u>	2 July 2018
<u>Hamed Pourbeyram</u>	1 February 2019
<u>Saeid Rostami</u>	10 February 2018
<u>Zahra Taghipour</u>	16 July 2018

## 3. Alumni Members

<b>Name</b>	<b>Company</b>	<b>Graduation Date</b>
<u>Alexander Albrecht</u>	The Univ. of New Mexico	May 2009
<u>Victor Gamiz</u>	Air Force Research Lab.	May 1995
<u>Jacob Jaramillo</u>	IDEX Optics & Photonics Marketplace	May 2012
<u>Alireza Kazemi</u>	The Ohio State Univ.	December 2016
Julien Mailfert	Lam Research Belgium BVBA	September 2010
<u>Stephen Myers</u>	SK Infrared	May 2013
<u>Brandyn Way</u>	Northrop Grumman Systems Corp.	June 2016
<u>Christopher Wilcox</u>	U.S. Naval Research Lab.	December 2009
<u>Jeremy Wright</u>	Sandia National Labs.	July 2014

## Seminars

### **Dr. Peter Bermel of Purdue University**

**Title:** Thermo-photovoltaic power generation from solar and waste heat

**Date and Time:** Wednesday, September 6, 2017 from 11:00 AM to Noon

**Dr. Bermel was a visiting scholar at UNM last year, and SPIE chapter found it a great opportunity to invite him to present his research in our center.**

**Abstract:** Thermophotovoltaics (TPV) generate electricity through a unique mechanism: harvesting thermal radiation with a photovoltaic cell. The input heat can be generated through a number of sources, including concentrated solar heating and waste heat. In principle, its heat-to-electricity efficiency can approach 85% at sufficiently high temperatures. Although the very first TPV devices had low performance, significant progress has recently been made by researchers worldwide in closing this gap. In these studies, several key themes have emerged, namely: efficiently harvesting high-temperature heat to power these devices; selectively radiating this heat to minimize wasted photons; and fabricating efficient, temperature-controlled photovoltaic cells with moderate bandgaps to generate maximal power. In this talk, we will review the limits of TPV in selected sustainable energy harvesting applications, the role of losses at various stages, and the potential of photonics and advanced semiconductor growth processes to help overcome these key challenges.

**Biography:** Peter Bermel is an associate professor of electrical and computer engineering and an associate director of graduate admissions at Purdue University. His work improves photovoltaic, thermophotovoltaic, and quantum systems using the principles of nanophotonics. He has published extensively in scientific peer-reviewed journals, and has been cited over 4600 times. Key topics include: high-performance thermophotovoltaics; photon recycling for high-efficiency lighting; and photonic crystals for enhancing photovoltaics.



## Outreach Activities

For our outreach projects, we have been working closely with CHTM's newly-made Outreach Work Group. We have had several outreach collaborations, with such people as Stefi Weisburd, Outreach Manager of UNM Engineering Outreach Programs, and Doris Williams, Optical Science and Engineering Program Adviser.

### 1. Science Fair

**South Valley Academic Science Fair**, January 25<sup>th</sup>, 2017

SPIE chapter officers talked with Students about their projects, and help them formulate the research plan.

### 2. College/Career Day

**Truman Middle School**, March 31<sup>st</sup>, 2017

SPIE officers, Zahra Taghipour and Lilian Casias, attended the College/Career Day at Truman Middle School. They helped answered student's questions about pursuing career in STEM fields.

### 3. Welcome BBQ

**Center for High Technology Materials, UNM**, September 8<sup>th</sup>, 2017

We hosted a barbeque at Center for High Technology Materials to welcome back students and researcher for the new semester.

### 4. NM State Fair Science Day

**Albuquerque, NM**, September 15<sup>th</sup>, 2017

Our members were responsible a booth at the New Mexico state fair. We had over 300 students throughout the day. We showed the Year of light kits that were sent to us from SPIE.

### 5. Lab Tours

Several Laboratory tours were performed in 2017, which included Scanning Electron Microscope (SEM), and Molecular Beam Epitaxy (MBE) laboratories tours, Ice cream making with liquid Nitrogen (LN2) for middle school students, etc.

## a. High School Students

**Espanola School**, May 12<sup>th</sup>, 2017

**Explora Science Centre Children Museum of ABQ**, June 20<sup>th</sup>, 2017

**Unite High School**, June 26<sup>th</sup>, 2017

## b. Middle School Students

**21st Century Public Academy school**, September 7<sup>th</sup>,

## UNM SPIE Student Chapter Individual Activities

**SPIE Student Travel Grant** – Zahra Taghipour

SPIE Optics+Photonics, San Diego, CA, August 2017

Presented her paper titled “*Extraction of Minority Carrier Diffusion Length of MWIR Type-II Superlattice nBp detector*”, which received the Best Student Paper Award from the conference committee members.

## Financial Summary

Description	Date	Expenses	Deposit	Balance
Balance start of 2017	Jan 2017	-	-	\$1488.62
Welcome BBQ	Sep 13 <sup>th</sup> 2017	\$99.31	-	\$1389.31

## Plans for 2017

### 1. Outreach Activities

**Science and Technology Day at the New Mexico State Fair**, September 2018

We plan to attend the Science and Technology Day at the New Mexico State Fair And take a couple of demos to the event.

**South Valley High School Outreach Demonstration**, February 12<sup>th</sup>, 2018

## 2. New SPIE T-shirt Design for 2018

We are planning on having a competition on a new T-shirt design, we love how creative our members can be when it comes to designing a new T-shirt and gives us extra funds.

## 3. 2018 Officer and Advisor Elections

During last year, a couple of student members/officers graduated. Prof. Krishna (SPIE chapter advisor) also moved to Ohio State University in spring 2017.

We intend to host a meeting for both invite new students to the chapter, and have an election for choosing new chapter officers and advisor.

## 4. Keep-up with SPIE Bulletin Board

To encourage recruitment and make our activities known at UNM, we constructed it in Dec. 2013 and plan to continue to keep up with it & have more updates.

## Thank you, SPIE!

Without SPIE's funding and support, our many achievements of 2017 would not have been possible. We owe a special thanks to the devotion of Dirk, Tasha, Alison, and Ben who make student chapters possible. The SPIE community provides many unique opportunities to enrich our members' careers and lives. The travel scholarships, seminars, and conferences enable students to network with experts in their field, while funding support for outreach projects encourage the local community to learn about more about optics and science. We are proud to be a part of SPIE. As students studying optoelectronics- and optics-based fields, we realize the significance of SPIE's mission to advance light-based technology. We apologize for turning this report a few days late but due to everyone's busy schedule with finals it was a bit difficult, however we promise to keep with deadlines. Thank you, SPIE!

-2017 SPIE Officers