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A ’22 indicates a spring graduate; summer and fall commencement occurs during FY2023
Thank you for your support of CREOL, The College of Optics and Photonics. We hope you enjoy looking back on our accomplishments from the past year (July 1, 2021 – June 30, 2022). There was certainly much to celebrate.

CREOL carries a reputation for innovation. Over the years we’ve developed groundbreaking ideas in optics and photonics here at UCF, and our faculty, students, and alumni are still making incredible advancements in the field.

For example, our Alumna of the Year, Dr. Félicie Albert ’04MS, Her original plan was to study astronomy, but when she was exposed to laser-specific sciences in CREOL, she shifted her goals. She earned her master’s degree from CREOL and went on to earn a doctorate in her home country of France. Her career and industry leadership make her the perfect recipient of this year’s award. You can read more about Félicie on page 14.

CREOL faculty also had their fair share of recognition this year. Two were honored as UCF Trustee Chair Professors. The five-year appointment recognizes the national and international reputation of Dr. Shin-Tson Wu, and Pegasus Professor Dr. Kathleen Richardson. A full list of all our award winners can be found on page 3.

One of our greatest strengths is our industry partnerships. CREOL was founded on the vision of supporting and expanding Florida’s optics industry and we continue to build on that goal through our engagement with the members of our Industrial Affiliates program. This mutually beneficial program serves as the conduit between industry professionals and CREOL faculty, students, and researchers. I encourage you to read more on pages 16 and 20.

Finally, I’d like to congratulate my longtime friend and colleague, Dr. MJ Soileau on his retirement (page 5). MJ was a big part of the reason I made the move from Texas to Florida to help get CREOL off the ground. Here we are more than 30 years later, and MJ has left very big shoes to fill. Luckily, CREOL has an amazing team to help me, and I was delighted when Dr. Patrick LiKamWa was appointed associate dean of academic programs. I know Patrick will help to unleash the full potential of CREOL students and faculty as we improve and grow our graduate and undergraduate programs.

Thank you again for your support, and I look forward to seeing you soon.

David J. Hagan, Ph.D.
Dean & Director
Pegasus Professor of Optics & Photonics
2021-22 Awards
July 1, 2021 – June 30, 2022

EXTERNAL AWARDS

FACULTY

Aravinda Kar
Schawlow Award, LIA
President Elect, LIA

Kathleen Richardson
Distinguished Life Member, ACerS
Joint Award, ECerS and ACerS

Shin-Tson Wu
Maria Goeppert Mayor Award, SPIE
Edwin H. Land Medal, Optica

STUDENTS

Ricardo Bustos-Ramirez '18MS '21PhD
Best Student Paper, IEEE Photonics Conference

He Cheng '19MS '22PhD
Photonics West Best Paper Award, SPIE

Jianghao (Jasper) Xiong '22PhD
Diamond Award - ILCS-FRL
Outstanding Graduate Student Award and Scholarship, IEEE Orlando

Murat Yessenov '19MS '22PhD
Boris P. Stoicheff Memorial Scholarship, Optica

Kun (Kelly) Yin '19MS '22PhD
Platinum Award - ILCS-FRL
Outstanding Graduate Student Award and Scholarship, IEEE Orlando

UNIVERSITY AWARDS

FACULTY

Ayman Abouraddy
Excellence in Research

Kathleen Richardson
Trustee Chair Professor

MJ Soileau
Emeritus Professor

Shin-Tson Wu
Trustee Chair Professor

STUDENTS

Xuan Lou
Founders’ Award

SERVICE TO UCF

Vicky Sue Ortiz Batson '99 '09MA
20 years

Deon Frank
20 years + Retiree

Denise Whiteside
15 years

Nathan Aultman
5 years

Rachel Agerton-Franzetta
Retiree

CREOL AWARDS

FACULTY

Ayman Abouraddy
Excellence in Research

Peter Delfyett
Teaching Incentive Program Award

Guifang Li
Granted Sabbatical 2022-2023

MJ Soileau
Excellence in Undergraduate Teaching

Shin-Tson Wu
Excellence in Graduate Teaching and Research Incentive Award

STUDENTS

Xiaowen (Steven) Hu '20MS
Student of the Year Finalist

Lawrence Trask '21MS
Best Student Poster Award

Murat Yessenov '19MS '22PhD
Student of the Year

Kun (Kelly) Yin '19MS '22PhD
Student of the Year Finalist

ALUMNI

Yuge (Esther) Huang '20PhD
Glenn Brown Prize, ILCS

Yi-Hsien Lin '06PhD
SPIE Fellow

Franklyn Quinlan '05MS '08PhD
Optica Fellow

ALUMNI

Félicie Albert '04MS
Distinguished Alumna (see page 14)

New UCF Trustee Chair Professors, Kathleen Richardson (left) and Shin-Tson Wu.

Note: A ’22 indicates a spring graduate; summer and fall commencement occurs during FY2023
Popescu Wins SPIE Award Before Tragic Accident

Groundbreaking work in the field of quantitative phase imaging earned Gabriel Popescu ’02PhD the 2022 Dennis Gabor Award in Diffractive Optics from the International Society for Optics and Photonics (SPIE). Awarded in January, SPIE cited multiple achievements by Popescu as the basis for the win, including his advancements in the technology that studies live cells. His imaging work advanced critical cancer research, including breast cancer detection and label-free tissue scanners for colorectal cancer screening.

On June 16, Popescu suffered a fatal collision while riding his motorcycle near his hometown of Prundu, Romania.

Popescu taught at the University of Illinois at Urbana-Champaign as the William L. Everitt Distinguished Professor of Electrical and Computer Engineering, where he directed the Quantitative Light Imaging Laboratory at the Beckman Institute for Advanced Science and Technology. He was also the founder and president of Phi Optics, an optical microscopy company developing the next generation of optical imaging systems through its Quantitative Phase Imaging platform.

He earned his doctorate from CREOL under the supervision of Aristide Dogariu and was recognized as the CREOL Distinguished Alumnus in 2017.

“TO this day, I am still using most of what I learned as a student at CREOL,” he said in a 2021 interview. “I work at a large institution with many brilliant scientists. These colleagues are collaborative, which is something that I was exposed to consistently while a student at UCF and came to value greatly in other scientists.”

Our sincere condolences to Gabi’s wife, Catherine Best, his children, Sofia and Sorin, and his mother, Maria.

INAUGURAL SENIOR DESIGN COMPETITION

CREOL hosted a senior design competition - the first of its kind for the college - organized by the student group IEEE Photonics Society and industry sponsor MKS. Undergraduate seniors in the photonic science and engineering degree program presented their projects to a panel of judges from industry and academia.

Congratulations to the Winners

1ST
Cristian Pearson ’22, Christian Spurgeon ’22, Aaron Jevitt, Gean Morales Portable Fluorescence Sensor for Lyme Disease Antibody Detection

2ND
Matt Bowman ’22, Nick Pinkham ’22, AJ Desantis, Bryce Moon Automated Laser Cavity Mirror Alignment & Beam Profiler System

3RD
Collan Dimitri ’22, Jacob Clevenger, Jose Vazquez, Ahmed al Busaidi Low Power Variable Optic with Automatic Distance Correction
After devoting more than 35 years of his career to UCF, MJ Soileau retired on June 17, 2022. Soileau came from North Texas State University to be the founding director of the Center for Research in Electro-Optics and Lasers (CREOL) in January 1987. He spent the next dozen years transforming the fledgling research center into one of the major educational and research institutions for optics in the world. Thanks to the strong foundation Soileau built, CREOL’s designation was upgraded in 2004 to the College of Optics and Photonics – the first of its kind in the United States.

Soileau went on to serve as UCF’s vice president for research & commercialization for 17 years spearheading transformational growth in research activities at UCF (see sidebar).

In 2016, Soileau returned to the faculty as distinguished professor of optics, physics, and electrical engineering and resumed his studies of laser-induced damage in optical material. At UCF’s Founders Day in April, he was honored with the CREOL Excellence in Undergraduate Teaching award. He now joins the ranks of emeritus professor.
SOILEAU’S CAREER HIGHLIGHTS AS VICE PRESIDENT OF RESEARCH & COMMERCIALIZATION

Extramural contracts and grants increased from $36M in 1999 to over $145M in 2016

UCF became a national leader in its patent portfolio and its new company incubation plan

The NanoScience Technology Center established

Established the Biomolecular Science Center which grew to become the College of Biomedical Science and eventually merged with the College of Medicine at the Burnett School of Biomedical Science

Reorganized and greatly expanded the Florida Space Institute

Recruited new leadership for: Florida Solar Energy Center, Institute for Simulation & Training, NanoScience Technology Center, and Florida Space Institute

Read more from Soileau in this 2013 Pegasus article.

“I took the job because of the opportunity to build an academic unit devoted to optics, to staff it with top scholars in the field of optics, and to attract excellent students. The simple idea was to build an academic unit that would be much better than I could ever be hired into, and then to become a member of it by the historical accident of being present at its birth!”

Soileau was honored as a Florida Icon by Florida Trend magazine in 2016. Scan/click to read more.

2004
School of Optics becomes CREOL, The College of Optics and Photonics

2016
Distinguished Professor of Optics, Physics, and Electrical Engineering

2022
Emeritus Professor

CREOL faculty and staff gifted Soileau a bicycle for his retirement.
Retired Army Officer Pursuing Ph.D.

Retired Army officer Robert Grimming is using his unique experience with the military to improve the future of military combat vehicles. A full-time CREOL graduate student, he earned his degree in electrical engineering from West Point Military Academy.

Grimming served in multiple positions in the Army, including logistics, explosive ordnance disposal and nuclear operations. One of his proudest moments was becoming an assistant professor at West Point, where he taught for three years.

“It was an honor working with such a diverse group of students motivated to excel in every aspect of their lives and contribute to their nation,” said Grimming.

Upon retiring, Grimming began teaching at Wekiva High School’s magnet program for laser photonics. He left teaching to pursue his doctorate, focusing on infrared imaging systems that will be directly applied to military optics. This includes developing LIWR applications for autonomous vehicle navigation used to advance military vehicle technology.

Being a part of both the Knight Vision lab and the Electro-Optical Infrared Systems group at CREOL reminds Grimming that science is something that can inspire anyone.

“People think that the math and sciences are challenging because it isn’t something that we use every day,” said Grimming. “But being a part of CREOL reminds me of why I enjoy it so much.”

Alumnus Converts Research, Lab Experience into Faculty Position

The life-long journey to full-time faculty member began for Josh Kaufman ’14PhD when he was a self-described “nerdy kid” reading engineering magazines. “To rewind the clock to that time, to now being offered a position on the faculty is incredible,” said Kaufman.

Kaufman arrived at UCF in 2008 after studying electrical engineering at Purdue University. That laid the foundation for his work at UCF studying fiber structures to produce micro and nanoparticles for nonlinear optical applications such as ultrafast switches, optical computers, and processing.

“Getting my own lab feels like the next natural step because my research has diverged from where I once started,” said Kaufman. “I began on one end of the optics spectrum and am now embracing the material sciences side of my research.”

After earning his degree and taking on the challenge of becoming an assistant in Ayman Abouraddy’s lab for the last thirteen years, Kaufman reflects on what it’s like to accomplish the dreams he once had as a child.

“I’m proud to have gotten to this point in my career,” said Kaufman. “It’s been a lot of work, but the payoff is worth it.”
Glebov, Richardson Help Recognize the United Nations International Year of Glass

A high-profile global conference celebrating the United Nations International Year of Glass (IYOG) included two professors from CREOL as featured speakers. February’s two-day conference in Geneva, Switzerland, included 30 speakers representing 90 countries. The presentations have been viewed more than 7,000 times worldwide.

The IYOG designation recognizes the pivotal role glass has played across centuries and cultures, from ancient Egyptian art to the silica glass in the fiber optic cables that channel the Internet today. The United Nations designated 2022 the IYOG through the petition of a team that included CREOL Pegasus Professor Kathleen Richardson who also virtually delivered a conference presentation “Seeing and Sensing the Future: Enabled by Infrared Glass Innovation.” Her remarks encompassed the historical development of infrared glass and its potential to address some of the United Nations 2030 Sustainable Development Goals (SDGs) in quality education, gender equality, climate action, and sustainable cities and communities, among others.

“Glass is renewable and has so many potential applications to address things like climate change,” said Richardson. “My talk focused on illustrating the history of glass, and its potential for the future. It is a good way to get the international community thinking about ways we can collaborate to solve some of these big problems.”

Glass science was just a portion of the topics discussed. Other speakers shared insights from areas including industry, medicine, academia, the media, museums, and art.

Also representing CREOL was research professor Leonid Glebov, who traveled to Geneva to deliver his presentation “Photo-Thermo-Refractive Glasses for Laser Applications.” Some of those laser applications include creating holograms that can map the Earth’s surface within 20 centimeters and increasingly precise cataract surgery.

“It’s significant from my viewpoint that CREOL had two representatives at this conference,” said Glebov. “When we were a young center, I had to do a lot of explaining. Now you say CREOL and everyone knows what that is.”
CREOL researchers are developing new photonic materials that could one day help enable low-power, ultra-fast, light-based computing and lead to quantum computing. The unique materials, known as topological insulators, are like wires that have been turned inside out, where the current runs along the outside and the interior is insulated. They could be used in circuit designs that allow for more processing power to be crammed into a single space without generating heat, thus avoiding the overheating problem today’s smaller and smaller circuits face.

In their latest work, published in the journal *Nature Materials*, the researchers demonstrated a new approach to creating the materials using a novel, chained, honeycomb lattice design which they laser etched onto a sample of silica, the material commonly used to make photonic circuits. Nodes in the design allow the researchers to modulate the current without bending or stretching the photonic wires, an essential feature needed for controlling the flow of light and thus information in a circuit.

The researchers envisioned the new design approach, introduced by the bimorphic topological insulators, will lead to a departure from traditional modulation techniques, bringing the technology of light-based computing one step closer to reality. Topological insulators could also one day lead to quantum computing as their features could be used to protect and harness fragile quantum information bits, thus allowing processing power hundreds of millions of times faster than today’s conventional computers.

The researchers confirmed their findings using advanced imaging techniques and numerical simulations.

“Bimorphic topological insulators introduce a new paradigm shift in the design of photonic circuitry by enabling secure transport of light packets with minimal losses,” said Georgios Pyrialakos, a CREOL postdoctoral researcher and the study’s lead author.

According to the study co-author and CREOL professor Demetrios Christodoulides, the next steps for the research include the incorporation of nonlinear materials into the lattice that could enable the active control of topological regions, thus creating custom pathways for light packets.
UCF Awarded $4.5 Million to Develop Non-GPS Navigation System

The Army Research Lab (ARL) awarded UCF a $4.5 million grant to develop a smart, computer vision-based navigation system that can be used when GPS is unavailable or jammed. The system will act as a cyber co-pilot that supports navigation of ground vehicles by using artificial intelligence and machine learning to assess computer imaging of complex terrain captured by the vehicle and by unmanned aerial vehicles (UAVs).

“For the Army, this is all about navigating in GPS denied environments wherein adversaries can jam or spoof GPS signals,” said Kyle Renshaw, the project’s principal investigator and a CREOL assistant professor.

The system will use geospatial databases to identify landmarks for correlation to imagery and will track object movements through video to estimate motion. Renshaw says although positioning by triangulation and relative motion are not new concepts, the researchers are using artificial intelligence to do this precisely and autonomously.

The cross disciplinary project also includes professors from UCF’s Department of Computer Science and Center for Research in Computer Vision, as well as Robert Crabbs, a CREOL senior research scientist. The team is partnering with researchers from the University of Arizona and the University of Memphis.

“I’m looking forward to working with ARL and the world-class team we’ve pulled together to address some real, significant and immediate problems for the Army,” said Renshaw. “The technologies and solutions we’re working on have other applications such as border security, disaster response, and autonomous driving.”

MFOCS II DOES THAT

MFOCS II is the core component of the Mounted Computing Environment. As the key enabler of any vehicle CSISR architecture, MFOCS II provides a fully integrated Mission Command suite of capabilities. A mission critical tactical server manages communications, sensors, embedded diagnostics, and applications through a single pane of glass. MFOCS II is empowering modernization, converging today and tomorrow.
First Keck Foundation Grant Totals $1M for UCF

One of the nation’s largest philanthropic organizations – the W.M. Keck Foundation – awarded UCF a $1 million science and engineering research grant. The grant will be used to fund a project led by CREOL professors Ayman Abouraddy and Demetrios Christodoulides titled “space-time optics for novel lightmatter interactions.” This project builds on their previous work developing so-called ‘space-time wave packets.’ These are pulsed laser beams with unique properties that stem from their structure in space and time. The researchers will exploit these new laser pulses to accelerate tiny particles, known as dielectric particles, that have not been accelerated before. Having this control over small dielectric particles could open new avenues for medicine and for materials and space sciences, the researchers say. These potential applications include using high-speed micro-particle collisions for medical therapy, better understanding how micro-sized space debris adversely affects space vehicles, and informing the use of solar sail propulsion for small-scale space probes.

This is UCF’s first Keck grant. William Myron Keck, the founder of the Superior Oil Company, established the Keck Foundation in 1954 which is now one of the nation’s largest philanthropic organizations with more than $1 billion in assets. The foundation invests in pioneering discoveries in science, engineering, and medical research that lead to breakthroughs and new technologies to save lives, offer innovative solutions, and add to the understanding of life and of the universe.

Graduate Students Awarded DEPS Grants, More Than Any Other University

The Directed Energy Professional Society (DEPS) awarded two CREOL graduate students research grants to continue their work in the area of directed energy.

Jessica Peña ’19MS ’22PhD and Owen Thome are part of the Laser Plasma Laboratory, which is part of UCF’s Center for Directed Energy. Also recognized was College of Engineering and Computer Science student, Nicholas Vail.

Peña was named the Dr. Samuel Blankenship Directed Energy Scholar award winner. A second-time grant recipient, she was awarded support for her work on laser light filament propagation at high altitude.

Thome received an award for his work on a new ultrafast long-wavelength infrared (LWIR) laser development. This novel type of a high-power laser system will be tested for the first time anywhere at UCF’s Townes Institute Science & Technology Experimentation Facility according to photonics professor Martin Richardson, who leads the Laser Plasma Lab and the Center for Directed Energy at UCF.

DEPS provides grants to students who are conducting promising research in directed energy technology, high-power laser development, high-power microwaves, and ultrashort pulse lasers.

“DEPS recognizes our students’ caliber and ingenuity, which is why it has given so many UCF students scholarships over the past decade — more than any other university,” said Richardson, who was named a DEPS Fellow in 2021.
An innovative device developed by researchers at CREOL and Orlando Health can save doctors critical time during life-or-death operations, like heart surgery. The real-time monitor provides instant blood analysis to let surgeons know if a deadly problem in many surgeries, blood coagulation, is happening.

Currently, to determine if a heart surgery patient’s blood is thin enough to avoid forming clots in a heart-lung machine, blood must be drawn throughout the procedure and sent to a lab for testing.

“There are two problems there,” said study co-author William DeCampli, a pediatric cardiac surgeon at Orlando Health Arnold Palmer Hospital for Children and professor of surgery in UCF’s College of Medicine. “One, we’re drawing blood from a patient periodically, and if this patient is a newborn baby, it doesn’t take much blood drawn to cause the baby to have a problem with blood loss. Secondly, when we send these tests away, it takes time to get the answer back, as much as 20 or 30 minutes. And that’s too long.”

DeCampli has been working with CREOL Pegasus Professor Aristide Dogariu since 2017 to develop the blood monitor. Their research is funded by the U.S. National Institutes of Health.

The collaboration developed after DeCampli learned of Dogariu’s work using light scattering from a laser to measure the thickness of various fluids and mixtures. The monitor uses an extremely small optical fiber that’s a fraction of a millimeter in diameter to assess the status of the blood and can be inserted directly into the tubes of a heart-lung machine or in a catheter, without having to draw blood from the patient.

The optics-based blood monitor has moved through in-lab testing and then a successful clinical trial, the results of which were published in Nature Biomedical Engineering. With continued success and funding, the researchers hope to see the blood monitor become available within the next five to seven years.

Study co-authors also included Jose Rafael Guzman-Sepulveda ’16MS ’19PhD, a researcher with the Center for Research and Advanced Studies of the National Polytechnic Institute in Mexico, and CREOL graduate research assistants, Mahed Batarseh ’20MS ’22PhD and Ruitao Wu ’21MS ’22PhD.

Real-time Blood Monitor Saves Doctors Critical Time During Surgery

Graduate research assistants Ruitao Wu and Mahed Batarseh demonstrate the UCF-developed optical blood monitor.

Above: The researchers’ model of red blood cells. Image credit: Jose Rafael Guzman-Sepulveda
Edesly Canto-Said ’89PhD has been watching the evolution of laser technology since the 1980s, when she was one of the first group of students to attend the newly formed Center for Research in Electro-Optics and Lasers (CREOL) at UCF. More than three decades later, Canto-Said is now serving as the chief technology officer (CTO) of laser-based solutions company Clark-MXR, Inc.

“It’s hard to believe how far laser technology has come since the 1980s,” said Canto-Said. “When I first began studying laser applications, we knew as scientists that they had the potential to solve many real-world problems. Now we actually see those applications on a day-to-day basis.”

A large part of Canto-Said’s duties as CTO includes overseeing the prototyping and manufacturing of industrial parts using ultrafast lasers, as well as producing lasers for scientific instrumentation. The inspiration behind much of the work being done at Clark-MXR is offering creative solutions to real-world problems. This is the force that drives Canto-Said out of bed and into the lab every day.

“It is exciting to see how much we can do with lasers,” said Canto-Said. “We solve problems found in many different fields, whether it is medical, mechanical or electronics — just to name a few.”

Time spent earning a CREOL degree helped shape Canto-Said into the scientist, and person, she is today. “I made many long-lasting friendships as CREOL grew from just a handful of us to many more,” she said. “On top of that, not a day goes by where I’m not applying something from my degree. I have felt very prepared throughout my career.”

Looking back on her time as a student, Canto-Said has advice for those looking to pursue a career as an optical scientist. “At CREOL I had excellent mentors and I wish I picked their brains more often,” she said. “Worry less about what lies ahead and more about absorbing the knowledge that surrounds you.”
Embracing change has yielded multiple rewards for Félicie Albert ’04MS including a new title as CREOL 2022 Distinguished Alumna of the Year.

One of the French-born physicist’s first opportunities to embrace change took place at the Ecole Centrale de Marseille of Marseille, France, where she was finishing undergraduate studies. An exchange program offered a big change - the chance to study in the U.S. with some of the finest optics professors.

“I struggled with school when I first arrived at UCF (in 2002),” said Albert. “I couldn’t speak English very well and all of my classes were in this brand-new language. Regardless, I was still enamored with the course material. My professors inspired me deeply from the very start.”

Albert’s original intent was to study and research astronomy. Her exposure to laser-specific sciences in CREOL shifted her goals entirely as she embraced the change.

“Building lasers is hands-on and very rewarding,” said Albert. “Learning about what these lasers could then be applied to after the building process is what really got me hooked in the field.”

After graduating from UCF with her master’s degree in optics, Albert returned home with her newfound passion for lasers. She hasn’t spent an idle moment since graduating with a doctorate from Ecole Polytechnique.

Now serving as the deputy director for the Center for High Energy Density Sciences and Jupiter Laser Facility at the Lawrence Livermore National Laboratory in California, Albert recollects just how fruitful her career has been.

“l’ve been with Livermore for the last fourteen years and have loved every moment of it,” said Albert. “Every day looks different and brings with it unique problems to solve. It’s a challenging and rewarding place to be a part of.”

Albert has received the Katherine E. Weimer Award from the American Physical Society, a Presidential Early Career Award for Scientists and Engineers (PECASE) and was recently named a fellow after a nomination from the APS Division of Plasma Physics. She is also the current chair of LaserNetUS, a network of high intensity laser facilities across America, of which UCF recently became a member.

“It is a true honor to receive this (Distinguished Alumna) title,” said Albert. “This is the place where everything truly started for me, so it is nice to see it come full circle.”
International Optics Leader Opens Application Lab in CREOL, Joins UCF Business Incubation Program

A unique new academic-industrial alliance between UCF and ficonTEC, a global leader in photonics manufacturing, is expected to bring a boost to the region and provide access to sophisticated industry production tools for students and faculty researchers. It also paves the way for students to take their prototypes from theoretical to literal and opens doors for regional industry growth.

FiconTEC, a German-based company with locations in Europe and the Far East, is expanding to Central Florida — joining UCF’s Business Incubation Program as a Soft Landing client and opening an applications lab at CREOL. The new lab will serve as a research and development manufacturing facility for ficonTEC, and will also be open to UCF students, faculty, and local industry partners.

Torsten Vahrenkamp, ficonTEC’s CEO, says the move started as an answer to interrupted global supply chains and growing demand for their products, in particular in North America where there is greater adoption of integrated photonics. The partnership with CREOL offers the added benefit of teaming up ficonTEC systems and engineers with faculty experts and leaders in the field.

“We could not have hoped for a better environment from which to re-launch our USA activities,” said Vahrenkamp.

CREOL students and faculty regularly produce prototypes and theoretical devices but are limited in their ability to create a functional model. FiconTEC’s application lab will bring the precise, advanced equipment needed to fabricate the finished prototypes that attract investors.

“This partnership brings a new dimension to CREOL’s established photonics R&D groups and in the United States as a whole,” said CREOL Dean, David Hagan. “It provides UCF students an unmatched opportunity to learn the techniques of photonics integration.”

FiconTEC is the fourth company to join UCF’s photonics incubator within CREOL, and the first and only to offer its own manufacturing capabilities. The incubator is also home to LC Matter Corporation, Plasmonics and Olkin Optics. Companies in the Incubator may use CREOL laboratory facilities, benefit from collaborations with faculty and graduate students, and access UCF’s business development resources.
Industry Partners Share Research, Advancements at Annual Symposium

A preview of the future in optics was shared over two days in April at the CREOL Industrial Affiliates Symposium. Top talent from around the globe gathered to explore and discuss topics including augmented and virtual reality, liquid crystal optical elements, and highlights of the latest glass research.

UCF President Alexander Cartwright, an internationally recognized researcher and scholar in the area of optical sensors, participated in the Symposium. Among the featured topics was a deeper look into the development of the James Webb Space Telescope, presented by Chief Mission Architect, Jon Arenberg, from Northrop Grumman. The Optimax Research Grant was awarded to CREOL professor Stephen Eikenberry for his proposal to create an OPASpec instrument.

“It was great to be reunited with old colleagues and make new friends,” said CREOL Dean, David Hagan. “This event offered a lot of optimism and encouragement around the growth of our field, and the success of CREOL.”

The annual Symposium brings together members of the CREOL Industrial Affiliates (IA) program which serves as a conduit between the college and industry professionals. IA members enjoy access to CREOL faculty, students and researchers while supporting the college through their membership dues.

“Our laboratories on campus are home to amazing developments in optics and photonics, but we’re just one piece of a much bigger community,” said Hagan. “Networking and learning from our Industrial Affiliates highlights the richness of that community.”

2022 INDUSTRIAL AFFILIATES SYMPOSIUM PRESENTERS:

- BEAM Co.
- U.S. Air Force Research Laboratory
- Northrup Grumman
- Meta Reality Labs
- OPTICA
- SPIE
- Florida Photonics Cluster
- Gentec-EO
- Critical Frequency Design
- CMS Laser (Control Micro Systems)
- ficonTEC
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<th>Degree</th>
<th>Dissertation Title</th>
<th>Advisor</th>
<th>Employer</th>
<th>Title</th>
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<tbody>
<tr>
<td>Kamal Mohamed Khalil</td>
<td>'18MS '21PhD</td>
<td>“Integrated thin-film lithium niobate devices and circuits for nonlinear- and quantum-optic applications”</td>
<td>Sasan Fathpour</td>
<td>Keysight Labs</td>
<td>Integrated Photonics Researcher</td>
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<tr>
<td>Abdelsalam '18MS '21PhD</td>
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<tr>
<td>Mahed Batarseh '20MS '22PhD</td>
<td></td>
<td>“On the Passive Sensing of Static and Dynamic Properties of Secondary Sources”</td>
<td>Aristide Dogariu</td>
<td>Intel Corporation</td>
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<td>He Cheng '19MS '22PhD</td>
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<td>“Volumetric Microfabrication With Structured Light”</td>
<td>Xiaoming Yu</td>
<td>Intel Corporation</td>
<td>Yield Engineer</td>
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<tr>
<td>Justin Cook '17MS '21PhD</td>
<td></td>
<td>“High Power Ytterbium and Thulium Fiber Lasers”</td>
<td>Martin Richardson</td>
<td>UCF CREOL</td>
<td>Research Scientist</td>
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<tr>
<td>Benjamin Croop '19MS '21PhD</td>
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<td>“Development of Quantitative Intensity-Based Single-Molecule Assays”</td>
<td>Kyu Young Han</td>
<td>Intel Corporation</td>
<td>Defect Metrology Yield Engineer</td>
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<tr>
<td>Mohammad Jobayer Hossain</td>
<td>'20MS '21PhD</td>
<td>“Measurement and Mitigation of Optical, Recombination and Resistive Losses in Silicon Photovoltaics”</td>
<td>Kristopher Davis</td>
<td>AIM Photonics</td>
<td>Electronic-Photonic Engineer</td>
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<td>'19MS '21PhD</td>
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<tr>
<td>Taiki Kawamori '19MS '21PhD</td>
<td></td>
<td>“Nonlinear Light-Matter Interactions in Novel Crystals for Broadband Mid-Infrared Generation”</td>
<td>Konstantin Vodopyanov</td>
<td>Passenger, Inc.</td>
<td>Optical Engineer</td>
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<tr>
<td>Stefan Gausmann '17MS '21PhD</td>
<td></td>
<td>“Specialty optical fibers and their application in fiber laser systems”</td>
<td>Axel Schulgen</td>
<td>Coherent Inc.</td>
<td>Senior Optical Engineer</td>
</tr>
<tr>
<td>Haley Kerrigan '17MS '21PhD</td>
<td></td>
<td>“Long-Range Laser-Material Interactions with High-Intensity Laser Pulses”</td>
<td>Martin Richardson</td>
<td>UCF CREOL</td>
<td>Research Scientist</td>
</tr>
</tbody>
</table>
Nafiseh Mohammadian ’18MS ’22PhD
Dissertation: “Development of Holographic Phase Masks for Wavefront Shaping”
Advisor: Ivan Divliansky
Employer: Google Inc.
Title: Optical Engineer

Jinhan Ren ’20MS ’21PhD
Dissertation: “Multi-functional fluorescence microscopy via PSF engineering for high-throughput super-resolution imaging”
Advisor: Kyu Young Han
Employer: KLA Corporation
Title: Optical Engineer

Enrique Sanchez Cristobal ’20MS ’21PhD
Dissertation: “High Spectral Brightness, Broad Area Quantum Cascade Lasers”
Advisor: Arkadiy Lyakh
Employer: IRGLARE, LLC.
Title: Senior Scientist

Zhean Shen ’21PhD
Dissertation: “On the Information Content in Unresolved Imaging”
Advisor: Aristide Dogariu
Employer: UCF CREOL
Title: Research Scientist

Mengdi Sun ’21MS ’22PhD
Dissertation: “Light-trapping transparent electrodes”
Advisor: Pieter Kik
Employer: Virginia Institute of Technology
Title: Research Scientist

Jianghao (Jasper) Xiong ’22PhD
Dissertation: “Diffractive Liquid Crystal Optical Elements for Near-eye Displays”
Advisor: Shin-Tson Wu
Employer: Beijing Institute of Technology
Title: Assistant Professor

Creol Student of the Year

Murat Yessenov ’19MS ’22PhD
Dissertation: “Physics and applications of space-time wave packets”
Advisor: Ayman Abouraddy (pictured on left)
Employer: UCF CREOL
Title: Research Scientist

Kun (Kelly) Yin ’19MS ’22PhD
Dissertation: “Patterned Liquid Crystal Devices for Near-Eye Displays”
Advisor: Shin-Tson Wu
Employer: Amazon Inc.
Title: Optical System Engineer

Joseph Coffaro ’21PhD
Advisor: Martin Richardson
Employer: Radiance Technologies
Title: Laser Engineer

Pooya Nabavi ’20MS ’22PhD
Dissertation: “Multi-Element Mobile Optical Wireless Communication Networks”
Advisor: Murat Yuksel
Employer: Apple
Title: Camera Hardware Designer

Sajad Saghaye-Polkoo ’19MS ’22PhD
Dissertation: Imaging Based Beam Steering for Optical Communication and Lidar Applications
Advisor: Kyle Renshaw
Employer: Intel Corporation
Title: Defect and Metrology Engineer

Physics Ph.D.

Electrical Engineering Ph.D.

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**FAST FACTS 2021-2022**

### Rankings

**U.S. News and World Report**
- **#20** Best Global Universities for Optics
- **#3** Best U.S. Universities for Optics*
- **#5** Best Graduate Degree in Atomic/Molecular/Optical Physics*
- **#8** Most Innovative Universities*

*Among public universities in the U.S.*

### Degrees Awarded

<table>
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<tr>
<th>Degree</th>
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<td>Bachelor’s</td>
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<td>Master’s</td>
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<tr>
<td>Doctorate</td>
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### Median Starting Salaries

<table>
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<tr>
<th>Degree</th>
<th>Salary (2020-2021 Graduates)</th>
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<tr>
<td>Bachelor’s</td>
<td>$71,500</td>
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<tr>
<td>Master’s</td>
<td>$92,500</td>
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<td>Doctorate</td>
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### Degrees per Year*

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<th>Year</th>
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<td>2020</td>
<td>25</td>
</tr>
<tr>
<td>2021</td>
<td>35</td>
</tr>
</tbody>
</table>

*Bachelor of Science in Photonic Science and Engineering

### Top Alumni Employers

- Amazon
- Apple
- Google
- Intel
- L3Harris
- Lockheed Martin
- Meta
- Microsoft
- Northrop Grumman
- Academia (Postdoctoral Research)
- National Research Labs

### Top 2% Global Optics Experts

44% of CREOL faculty were recognized by the journal *PLOS Biology* as being among the world’s top scholars

### Faculty with Ph.D.s

100%
INDUSTRIAL AFFILIATES

Membership in the CREOL Industrial Affiliates (IA) program provides corporations, organizations, and individuals networking and collaboration opportunities with our research faculty and students as well as other IA members. In addition, IA members can readily connect with optics, photonics, and industrial organizations in which CREOL maintains active participation and leadership roles.

LIFE MEMBERS
Cobb Family Foundation
Northrop Grumman Corp.
Nufern

MEMORIAL MEMBERS
Dr. Arthur H. Guenther
Dr. William C. Schwartz

MEDALLION MEMBERS
Breault Research
IPG Photonics
MKS (Newport, Ophir, Spectra-Physics)

SENIOR MEMBERS
AFL
ASML US
BAE Systems
CST of America
EXFO Optical Products*
Facebook Reality Labs
FARO Technologies
Google*

AFFILIATE MEMBERS
Analog Modules
Andor Technology
Applicote Associates LLC
Asphericon Inc.
Avo Photonics
BEAM Co.
Coherent Inc.
CMS Laser (formerly Control Micro Systems)
DataRay Inc.
Edmund Optics
Elbit Systems of America
eVision LLC
Finetech
Gentec-EO
L3Harris Corporation
HORIBA Jobin Yvon Inc.
J.A. Wollham Co.
JENOPTIK Optical Systems Inc.
KBR
Laser Institute of America
LG Electronics

*New Members

PUBLICATIONS*
PUBLICATIONS

Top Published Faculty

• Shin-Tson Wu
• Rodrigo Amezcua-Correa
• Kathleen Richardson
• Martin Richardson
• Stephen Eikenberry

Research Funding

Top Funded Principal Investigators

• Kyle Renshaw (pictured)
• Ayman Abouraddy
• Demetrios Christodoulides
• Felix Tan ’14MS ’19PhD
• Robert Crabbs

Patents & Publishing

204 Publications*
14 Patents Awarded

*Refereed Journal Publications