OFFICE OF RESEARCH
2020-2021 ANNUAL REPORT

FACULTY CLUSTERS

Collaboration Meets Innovation

REACT Cluster Members Recognized for Contributions to Cleaner, More Efficient Energy

By: Robert Wells

UCF's Renewable Energy and Chemical Transformation cluster members earned important distinctions last year that recognized their contributions to the renewable energy and chemical transformation field.

The cluster, which includes researchers from physics, engineering, and chemistry, carries out research that provides a mechanistic understanding of chemical processes and characteristics of low dimensional catalysts, thereby facilitating the discovery of novel materials for catalyzing energy production, especially energy from renewable sources such as solar.

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The award, which is given to scientists who've made important contributions to their field, recognized Rahman's distinguished contributions to computational and theoretical nanoscience, in predictions of chemical, vibrational, and structural properties of low-dimensional systems, together with diversity in STEM.

Also last year, Rahman and cluster member Fudong Liu were part of a team that received a $750,000 grant from the National Science Foundation to research ways to reduce the amount of expensive, noble metals needed to catalyze chemical reactions.

Liu is an assistant professor in UCF's Department of Civil, Environmental, and Construction Engineering.

In addition, Liu and Shaohua Xie, a postdoctoral associate in the Department of Civil, Environmental, and Construction Engineering, won the national TechConnect Conference's 2020 TechConnect Defense Innovation Award that recognizes technology that can positively impact national security. Their winning technology removes more than 90 percent of pollutants from engine exhaust at low temperatures by using novel environmental catalysts with universal, scalable fabrication techniques.

Meanwhile, William Kaden, an assistant professor in the Department of Physics, was able to secure another NSF $500,000 grant which is being used to purchase a Near-Ambient Pressure Xray Photoelectron Spectroscopy. The instrument, once fully installed, will be one-of-a-kind in the southeast allowing the cluster to conduct even more sophisticated research.

Cluster members also continued to publish research in various journals, including:

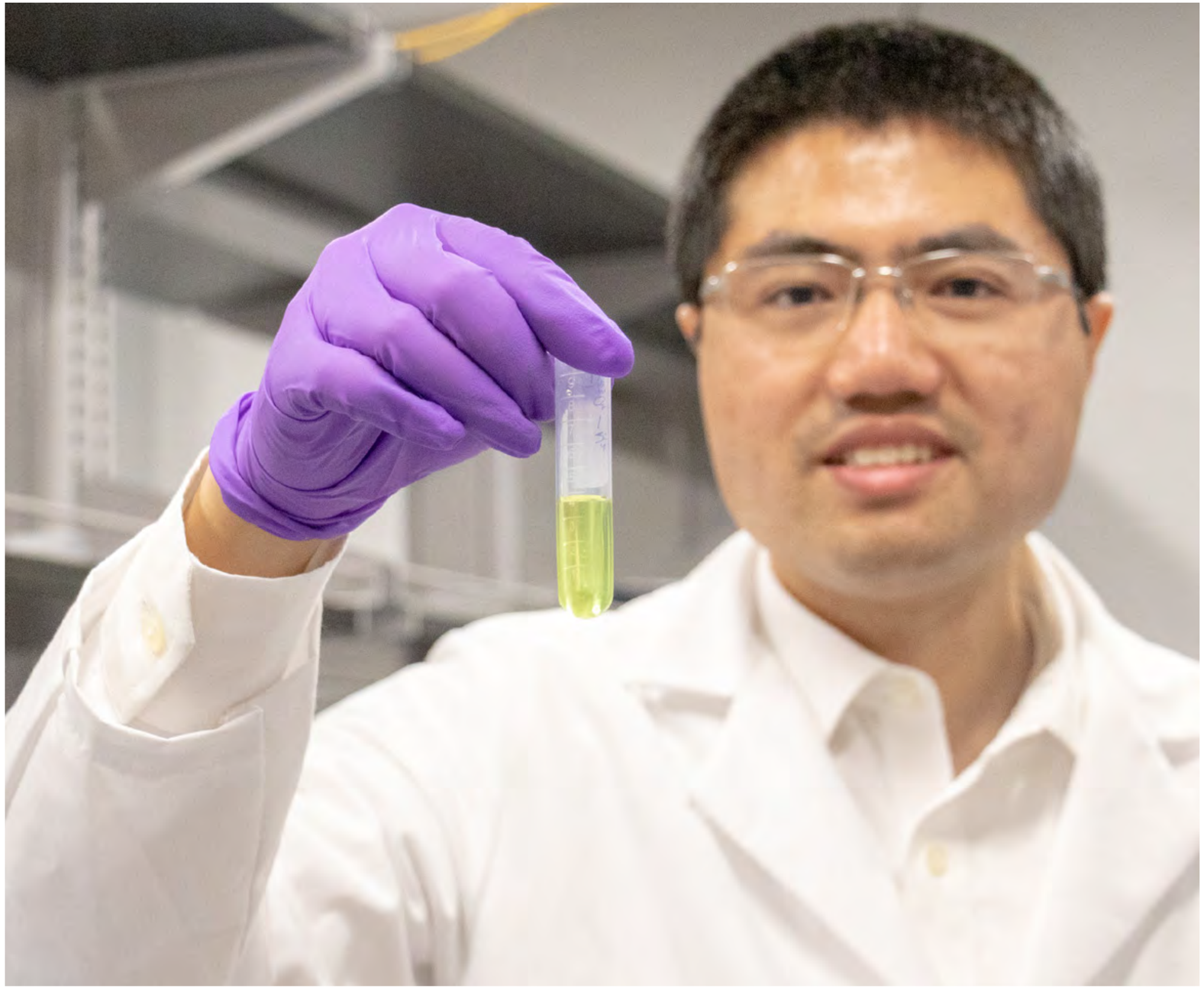
Xiaofeng Feng, an assistant professor in UCF's Department of Physics, published two articles on the effect of microenvironment on electrochemical catalysis in the journals Nature Communications and ACS Energy Letters.

Yang Yang, an assistant professor in UCF's Department of Materials Science and Engineering, published articles about his research to improve battery life and safety in the journals Advanced Materials and Advanced Energy Materials and about his saltwater battery research in Nature Communications.

Students working with cluster members found much success in 2020 including:

Kaden saw two of his doctoral students, Asim Khaniya and Bijoya Dhar, graduate and hired in postdoctoral positions. Khaniya works at Brookhaven National Laboratory researching ambient pressure x-ray photoelectron spectroscopy/ infrared absorption spectroscopy, and Dhar studies electrocatalysis at Pacific Northwest National Laboratory.

Two of Rahman's doctoral students, Naseem Uddin and Mahboob Ur-Rehman, graduated and have secured the next steps. Uddin accepted a postdoctoral position at Wayne State University, and Ur-Rehman accepted a residency in medical physics at the University of Arizona. Rahman jointly supervised Ur-Rehman



with Omar Zeidan at Orlando Health and Kevin Erhart at .decimal. Rahman's postdoctoral associate and graduate student Tao Jiang also secured a position and will work as a postdoctoral researcher at Ames Laboratory.

Feng's first graduate student, Lin Hu, graduated in December. Hu received the College of Engineering and Computer Science Graduate Excellence Award and the Outstanding Dissertation Award as part of Founder's Day.

Additional cluster member achievements include:

Rahman co-edited the new Springer Handbook of Surface Science.

Rahman was selected to be a Senior Mercator Fellow (Guest Professorship) of the German Research Foundation DFG and gave (virtually) invited lectures to doctoral students at Ruhr-University Bochum, Germany. She will be visiting the university in the near future.

"The goal for the cluster for the coming year is to continue to raise its profile and to continue to do world-class research and secure new funding," Rahman says. "Cluster members will also continue to pursue collaborative research with colleagues at UCF and elsewhere — a process already put in place through the REACT biweekly distinguished seminar series," she says.

The series is available to the research community through the American Vacuum Society.

Total award funding for 2020 credited to REACT was more than $1.7 million.