



## Zakya Kafafi

*An international leader in materials research*

By Humaira Taz

Zakya Kafafi's journey in materials science has taken her through many roles at various organizations all over the world. After completing her bachelor's degree from the University of Houston, and master's and PhD degrees from Rice University—all in chemistry—Kafafi went to London, England, with her family for a few years before traveling to Cairo, Egypt, and working in academia as an assistant professor.

During a sabbatical leave in the United States, she learned of a position available at the US Naval Research Laboratory (NRL) in the Optical Sciences Division. At that time, NRL had just started some projects on organic nonlinear optical materials. That was the beginning of Kafafi's 21 years of work at NRL, transitioning from a chemist, who was used to determining molecular structures, identifying catalytic reaction intermediates, and delineating reaction mechanisms, to a physicist and materials researcher working on developing organic light-emitting and charge-transport materials, and characterizing and understanding their properties for organic light-emitting diodes (OLEDs).

Looking back, this was the work she enjoyed the most. "We started the development of OLED materials and devices back in the early 90s, and now you can hold phones with OLED screens in your hand and buy large flat panel OLED TVs! I had stumbled on this project by chance. I discovered how enjoyable applied research is. The most important thing that a PhD [program] teaches you is how to solve a problem. I had no prior background in this emerging field of organic optoelectronics, yet I was able to navigate my way through and add value to this area of research."

Soon after her career at NRL, she joined the National Science Foundation (NSF) as the first female director of the Division of Materials Research. This was one of the largest divisions at NSF, making her the leader of almost a billion dollar budget portfolio during her three-year appointment, which included teams of both single and interdisciplinary groups of investigators, as well as big materials research science and engineering centers and large facilities.

"It was certainly challenging, especially considering the time," she responded. "Most divisions are composed of at least 50% of personnel who are rotators from academia (i.e., temporary and ever changing). The materials division was primarily composed of permanent staff and proposed ideas that were different from the status quo. As a result, they faced significant resistance," she added.

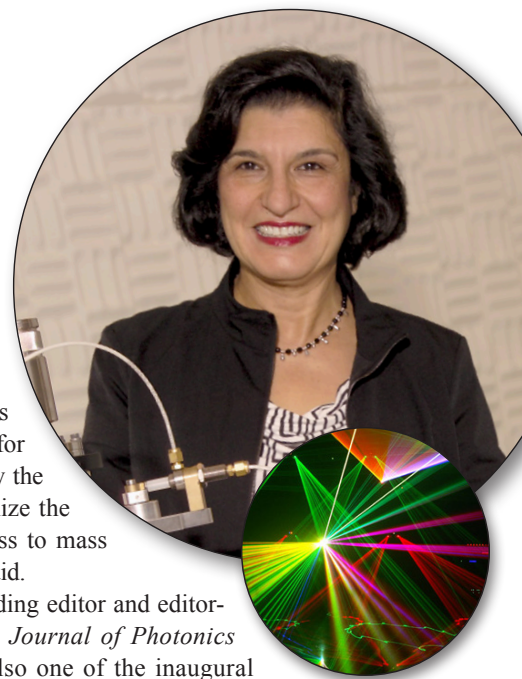
Kafafi is currently a Distinguished Research Fellow in the Department of Electrical and Computer Engineering at Lehigh University. Her research is focused on metallic plasmonic nanostructures that can enhance solar light absorption and harvesting in organic solar cells. This approach allows one to increase

the optical but not the physical thickness of the light absorption layer, which is critical for thin-film devices. "Organic solar cells have been researched for quite some time. Now the challenge is to optimize the manufacturing process to mass produce them," she said.

Kafafi is the founding editor and editor-in-chief of the *SPIE Journal of Photonics for Energy*. She is also one of the inaugural deputy editors of the American Association for the Advancement of Science online journal, *Science Advances*. She was recently awarded the 2017 Hillebrand Prize from the Chemical Society of Washington. Outside of the United States, she has been awarded the prestigious Kuwait Prize in Applied Sciences (Clean and Sustainable Energy Technologies) from the Kuwait Foundation for the Advancement of Sciences.

Kafafi has been affiliated with MRS since the early years, noting with pride that she attends every MRS Fall Meeting. "The best part about MRS is how progressive it is as a society. It is a very interdisciplinary platform with papers and symposia covering all important areas of science and engineering," she said. Kafafi's contribution to MRS has been invaluable as well. As an MRS Fellow, she has organized many symposia for the meetings and has served as chair of the MRS Awards Nominations Subcommittee, which is responsible for increasing the number of MRS Award nominees from groups that are historically underrepresented as MRS Award recipients. "You see non-US members comprise more than 40% of MRS, yet they form less than 20% of the MRS Award recipients. Our goal is to change that—to include more nominations for international, female, and minority scientists. We are already seeing the result of our efforts. The percentage of women becoming MRS Fellows is on the rise," she said.

Outside of her scientific activities, Kafafi loves traveling. She said that the best education one can receive is to engage with people from different parts of the world, which her work has allowed. She also enjoys scuba diving, skiing, and theater. When asked for her advice to young scientists, she stressed the importance of having a mentor. "Always try to have a good mentor, and if you can, be a mentor to other people. Don't be afraid of taking up something that you know nothing about. Jump into opportunities, be ready to learn on the job, and, most importantly, never be afraid to ask questions." Wisser words have never been said! □



Humaira Taz is an entrepreneur-in-residence at TandemLaunch Inc. and CTO of her startup, Omniply in Montreal, Canada.

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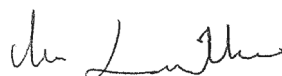
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Focus Issue topics for 2021 will be selected by the Editor-in-Chief and Associate Editors by February 28, 2020.

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