POSTDOC APPRECIATION WEEK 2021: RESEARCH SPOTLIGHT

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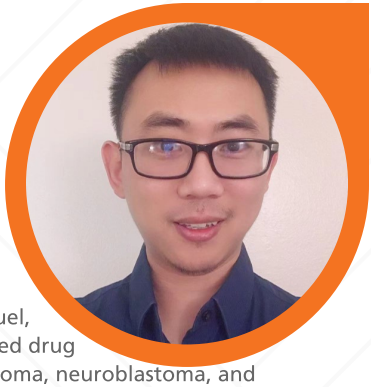

Field of Study
Chemistry

What impact do you want your research to have?
My research focuses on the development of carbon dots and their property exploration with a variety of applications on robotics, 3D printing, photocatalysis, thermoelectricity, rocket fuel, bioimaging, zebrafish, gene therapy, nanomedicine, and targeted drug delivery for the treatment of Alzheimer's disease (AD), glioblastoma, neuroblastoma, and lymphoma. Considering the interdisciplinary applicability of carbon dots, the aforementioned research will have a broad impact on chemistry, biochemistry, biomedical engineering, public health, engineering, energy, and environment.

What inspired you to pursue your area of research?
Carbon dots were firstly and officially introduced in 2006. Since then, many unique properties have been found on this type of nanomaterial. Most importantly, carbon dots almost combine all merits from different types of nanomaterials. In detail, carbon dots have small particle size (1-10 nm), high photoluminescence, photostability, water solubility, biocompatibility, nontoxicity, abundant surface functional groups, and tunable surface functionality. Among them, high biocompatible and nontoxicity can be confirmed by their wide presence in nature such as beer, honey, and grilled food. Thus, they are "green" and can be reliably used in various applications, especially in biomedical applications. In conclusion, they are a group of superior promising nanomaterials.

What is most exciting about your research?
My research is original and usually brings significant findings. For instance, I developed a type of gel-like CDs, which proved to be an excellent photocatalyst that is comparable to graphitic carbon nitride. And conjugation between gel-like CDs and graphitic carbon nitride revealed a synergistic effect in the degradation of diverse water pollutants (doi: 10.1016/j.jcis.2021.04.121). Also, the gel-like CDs can significantly enhance thermoelectric effect by 20% (doi: 10.1016/j.jallcom.2020.157916) and rocket fuel combustion efficiency by 20% (doi: 10.1016/j.combustflame.2020.11.024), which is extremely significant to energy and aerospace engineering, respectively. In addition, I developed another type of yellow CDs, which can significantly improve the photosynthesis efficiency of plants (doi: 10.1021/acs.jafc.1c01094). And most importantly, my review article on "Crossing the blood-brain barrier with nanoparticles" (doi: 10.1016/j.jconrel.2017.12.015) immediately attracted much attention once it was published and became an important reference for many researchers. If you are interested, you are welcome to read more from my Google Scholar webpage (https://scholar.google.com/citations?hl=en&user=yK8IP9gAAAAJ&view_op=list_works).

What makes your research unique?
The uniqueness of my research resides in the carbon dot species. For any type of study, usually we conduct experiments on several types of carbon dots for comparison before moving on to deeper studies and drawing a conclusion. Therefore, the goal of my research is always to pursue the best performance of our carbon dots as well as the most exciting results.

What are your plans after finishing your postdoc at the University?
Due to the diversity of my research, I am open to various industrial, academic and professional positions.

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