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Nanoscale Horizons Emerging Investigator Series: Dr Yuefei Wang, Tianjin University, China

Our Emerging Investigator Series features exceptional work by early-career nanoscience and nanotechnology researchers. Read Yuefei Wang's Emerging Investigator Series article 'Full-color peptide-based fluorescent nanomaterials assembled under the control of amino acid doping' (https://doi.org/10.1039/D4NH00400K) and read more about him in the interview below.

Dr Yuefei Wang received his PhD from the Department of Chemical Engineering at Tianjin University, China, in 2015, and worked as a visiting scholar in Prof. Nicholas A. Kotov's lab at the University of Michigan, Ann Arbor, USA, from 2018 to 2019. He is currently a professor and assistant dean of the School of Chemical Engineering and Technology, as well as the deputy director of the Institute of Chemical Engineering at Tianjin University. Additionally, he is a principal investigator at the State Key Laboratory of Chemical Engineering and Low-Carbon Technology. His research interests primarily focus on the synthesis of peptide-based functional materials and the applications of these biomaterials in medicine, sensing, and catalysis.

Read Yuefei Wang's Emerging Investigator Series article 'Full-color peptide-based fluorescent nanomaterials assembled under the control of amino acid doping' (https://doi.org/10.1039/D4NH00400K) and read more about him in the interview below:

NH: Your recent Nanoscale Horizons Communication describes a simple approach to synthesizing full-colour fluorescent nanomaterials with broad-spectrum fluorescence emissions, high optical stability, and long fluorescence lifetimes. How has your research evolved from your first article to this most recent article and where do you see your research going in future?

YW: In 2020, we discovered that ferrocene-modified short peptides could self-assemble into fluorescent peptidyl nanoparticles exhibiting rainbow-colored emission. This work was featured in the American Chemical Society's Weekly Press-Pacs. However, the high cost of the peptides and their relatively low quantum yield limited their practical applications. Based on this previous work, we have now developed a simpler and more efficient strategy to synthesize full-colour fluorescent nanomaterials with broad-spectrum emission, high optical stability, and extended fluorescence lifetimes. By modulating intermolecular interactions through amino acid doping during enzyme-catalyzed oxidative self-assembly of tyrosine-based peptides, we achieved precise control over fluorescence emission wavelengths. We believe these bioluminescent materials represent a new class of cost-effective, environmentally friendly, and biocompatible nanomaterials with broad potential in bioimaging, biosensing, and even optoelectronic devices.

NH: How do you feel about Nanoscale Horizons as a place to publish research on this topic?

YW: *Nanoscale Horizons* is a prestigious international journal renowned for publishing cutting-edge research in nanoscience and nanotechnology. Our work aligns perfectly with the journal's scope, addressing innovative topics at the forefront of the field.

NH: What aspect of your work are you most excited about at the moment?

YW: We report a novel enzymatic strategy for synthesizing tunable, biocompatible pigments *via* oxidative self-assembly of tyrosine-based peptides. This green, scalable approach holds significant promise for biomedical and cosmetic applications.

NH: In your opinion, what are the most important questions to be asked/answered in this field of research?

YW: Two critical questions remain to be addressed in this field. First, scalable

synthesis methods must be developed to enable the large-scale production of these biological pigments while maintaining their functional properties. Second, the fundamental mechanism underlying their broad-spectrum fluorescence emissions remains unclear, necessitating further investigation into the relationship between their nano/molecular structures and optical properties. A deeper understanding of these aspects will be essential for advancing both fundamental science and practical applications.

NH: What do you find most challenging about your research?

YW: A fundamental challenge in peptide-based materials science is the lack of established structure–function relationships. Current designs rely heavily on empirical approaches, which limits the rational development of peptides with predefined properties. Overcoming this requires systematic studies correlating molecular architecture with functional output.

NH: In which upcoming conferences or events may our readers meet you?

YW: I actively participate in international academic conferences and have been invited to deliver plenary and keynote lectures at prominent events. This year I will attend several important conferences, including: The 10th International Conference on Nanoscience and Technology in Beijing, China, and the Nature Conference on low carbon chemical processes, to be held in September in Tianjin, China.

NH: How do you spend your spare time?

YW: Outside of work, I maintain an active lifestyle through basketball, table tennis, and hiking.

NH: Can you share one piece of career-related advice or wisdom with other early career scientists?

YW: For early-career scientists working with limited funding and resources, it is crucial to concentrate on research areas where you have both genuine interest and demonstrated capability. Focus on tackling fundamental problems in your field where you can make innovative, meaningful contributions.