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Nanoscale Horizons Emerging Investigator Series: Dr Jia-Ahn Pan, Pitzer and Scripps Colleges, United States

Our Emerging Investigator Series features exceptional work by early-career nanoscience and nanotechnology researchers. Read Dr Jia-Ahn Pan's Emerging Investigator Series article 'Enhanced upconversion and photoconductive nanocomposites of lanthanide-doped nanoparticles functionalized with low-vibrational-energy inorganic ligands' (<https://doi.org/10.1039/D4NH00555D>) and read more about him in the interview below.



Dr Jia-Ahn Pan is an assistant professor of chemistry in the Department of Natural Sciences at Pitzer and Scripps Colleges. He obtained his Bachelor's degree in chemistry and mathematics from Bates College and a PhD in chemistry from the University of Chicago in 2022. He then carried out postdoctoral research at the Lawrence Berkeley National Laboratory before joining Pitzer and Scripps Colleges in 2024. Research in the Pan lab focuses on developing ligand chemistries for colloidal nanocrystals, such as quantum dots and upconverting nanoparticles. To achieve this, the lab explores various classes of nanocrystal ligands, aiming to enhance optoelectronic properties, enable coupling between different types of nanocrystals, and facilitate device integration.

Read Dr Jia-Ahn Pan Emerging Investigator Series article 'Enhanced upconversion and photoconductive nanocomposites of lanthanide-doped nanoparticles functionalized with low-vibrational-energy inorganic ligands' (<https://doi.org/10.1039/D4NH00555D>) and read more about him in the interview below:

NH: Your recent *Nanoscale Horizons Communication* describes upconverting nanoparticles (UCNPs) that convert near-infrared (IR) light into higher-energy visible light, allowing them to be used in applications such as biological imaging, nanothermometry, and photodetection. How has your research evolved from your first article to this most recent article and where do you see your research going in future?

JAP: During my graduate studies, I was introduced to inorganic ligands for enhancing the electronic coupling of colloidal quantum dots. This recent article shows that specific inorganic ligands (with low vibrational energies and semiconducting properties) can improve the emission of UCNPs and provide them with new functionalities. Moving forward, I hope to further explore more "active" ligands for various types of UCNPs and other colloidal nanomaterials.

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

JAP: This was my first time publishing with the Royal Society of Chemistry, and I had a great experience with *Nanoscale Horizons*, including receiving timely and constructive feedback from reviewers. In addition, writing the "New Concepts" paragraph helped me think more deeply about the main findings of my paper and how they can be further extended.

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

JAP: As a new PI, I am excited to have the chance to design and put together my own custom synthetic and characterization tools. I look forward to seeing them come together to explore new research directions.

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

JAP: It is still a challenge to assemble colloidal nanocrystals in a true "Lego"-like manner. Achieving the capability to position different types of nanocrystals with arbitrary nanoscale precision will allow us to explore new emergent properties from more complex inter-particle interactions. Solving this problem will require the development of new and creative ligand chemistries.

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

JAP: Managing a team of researchers well. Unlike research and teaching, it

often feels like professors rarely receive much training in being effective managers.

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

JAP: I will be attending the American Conference on Inorganic Nanoscience this summer. I also occasionally attend ACS and MRS conferences.

NH: How do you spend your spare time?

JAP: I enjoy spending time outdoors. In my current stage of life, this involves exploring new parks and areas around my neighborhood on my electric bike, towing my 2-year-old in a trailer.

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

JAP: Stay open to being wrong—some of the most exciting discoveries come from ideas that initially challenged your assumptions.