

Asst. Prof. Dr. Watcharaphol Paritmongkol, Vidyasirimedhi Institute of Science and Technology (VISTEC)

Research Achievements

Metal–organic chalcogenolates (MOCs) are hybrid organic–inorganic semiconductors that combine molecular-level structural control with tunable optical and electronic properties. Our research demonstrates how fundamental advances in materials chemistry can be translated into innovative technologies. We developed a chelation-driven dissolution and controlled crystallization strategy (*J. Am. Chem. Soc.*, 2025, DOI 10.1021/jacs.5c10260), and a rapid, scalable nanocrystal synthesis (*Adv. Funct. Mater.*, 2024, DOI 10.1002/adfm.202423516), overcoming major processing limitations and enabling systematic control of MOC structures and properties. The resulting nanocrystals show high hole mobility competitive with leading hole-transport materials, creating a foundation for electronic applications. Building on this scientific understanding, we are integrating MOCs into functional devices, including room-temperature NO₂ gas sensors for environmental monitoring and photodetectors for optoelectronic applications. In parallel, we are extending related chalcogen chemistry toward circular technologies for selectively recovering valuable metals from electronic and battery waste. These recycling efforts aim to establish scalable routes for closing material loops in future electronic and battery technologies. By linking materials discovery and processing with device engineering and circular resource recovery, this work exemplifies the STS Forum theme “From Science to Innovative Technologies” while strengthening Thailand’s capabilities in advanced materials, semiconductor technologies, and sustainable innovation.

Professional Highlights

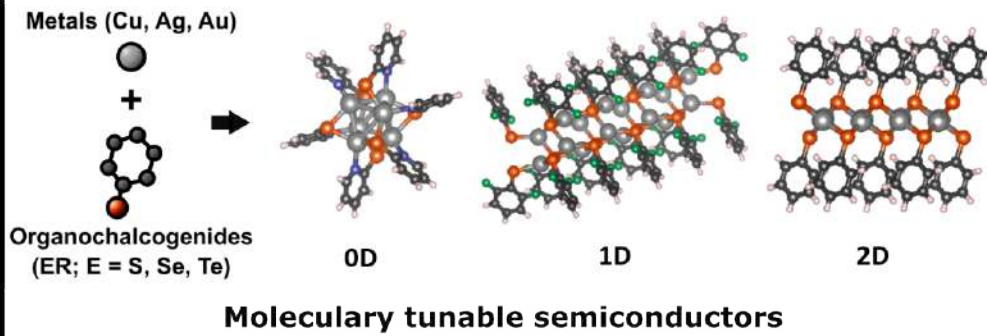
2024-present	Early Career Advisory Board Member & Scientific Editor, Inorganic Chemistry Frontiers, Royal Society of Chemistry (RSC)
2023-2025	Committee Member, Thailand Younger Chemists Network, Chemical Society of Thailand
2026	Rising Start in Materials Science, ACS Materials Au
2026	ACES-CST Early Career Award for Contribution to Other Chemistry Fields
2026	Outstanding Research Award, National Research Council of Thailand
2025	Bronze Award, Thailand Research Expo 2025
2025	The 31st Science & Technology Research Grant, Thailand Toray Science Foundation
2025	Outstanding Thesis Award, National Research Council of Thailand
2023	Research Grant for New Scholar, National Research Council of Thailand (1 of 11 selected recipients)
2021-2022	Young Scientist Ambassador at the 70 th and the 71st Lindau Nobel Laureate Meetings
2020-2022	Best Poster Awards, 2022, 2021, and 2020 Materials Research Society (MRS) Fall Meeting

What We Seek for Collaboration

Research Collaborators, Research Funding, Start-up Funding, Industrial Partners

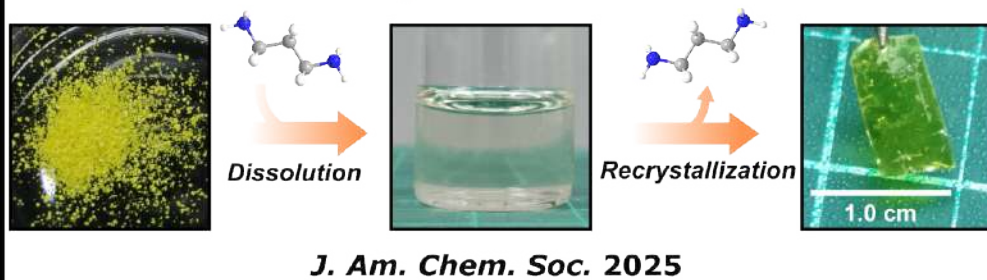
1 MATERIALS SCIENCE

Metal-organic chalcogenolates

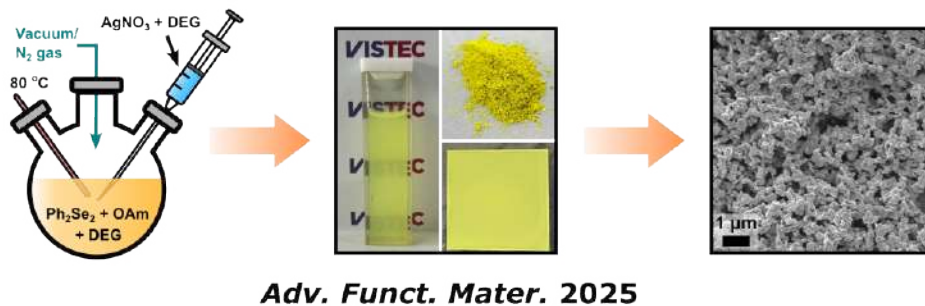


2 ENABLING PROCESSING

Chelation-driven Dissolution & Controlled Crystallization



Rapid, Scalable Nanocrystal Synthesis

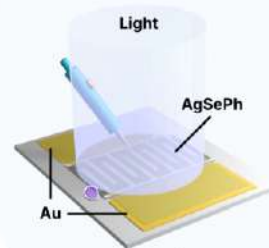


3 INNOVATIVE TECHNOLOGIES

Environmental Sensing



Electronics



Sustainable Resource Recovery

