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Department of Chemistry

Brown and Williamson Series

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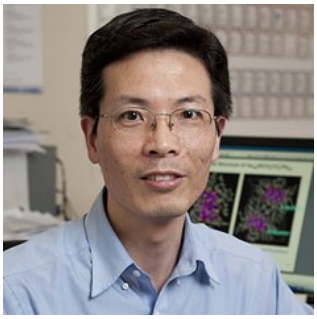
12:30 pm
Via: MS TEAMS



Rongchao Jin, Ph.D.

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Toward Atomic Precision in Nanoscience: Controlling Nanoparticles at the Single-Atom, Single-Electron Level

Abstract

Recent research in nanoscience has advanced toward controlling nanoparticles with atomic precision. In this talk I will present some breakthroughs in gold nanoparticle research, including the atomically precise synthesis method, total structure determination by X-ray crystallography, new properties and applications in catalysis. Such perfect gold nanoparticles possess well-defined formulas of $Au_n(SR)_m$, where SR = thiolate ligand, *n* and *m* refer to the precise numbers of gold atoms and surface ligands, respectively. With the achieved atomic precision, significant progress has been achieved in determining the total structures of $Au_n(SR)_m$ nanoclusters ranging from subnanometer $Au_{18}(SR)_{14}$ to 2.2 nm $Au_{246}(SR)_{80}$. These ultrasmall nanoparticles exhibit intriguing electronic and optical properties with manifestations of strong quantum size effects and also allow for quantum-state manipulation at the single-electron level. The attainment of atomically precise nanoparticles has offered exciting opportunities to pursue many fundamental issues that were previously difficult to tackle. Such nanoclusters also hold potential in catalysis, optics, energy conversion, and sensing applications.

BIO:

Rongchao Jin is a Materials & Physical chemist. He received his Ph.D. in Chemistry from Northwestern University in 2003 (advisor: Chad Mirkin). Then, he conducted postdoctoral research at the University of Chicago (advisor: Norbert Scherer).

He joined the chemistry faculty of Carnegie Mellon University in 2006, and was promoted to Associate Professor in 2012 and Full Professor in 2015. His research focuses on atomically precise metal nanoparticles. He has been on the list of Most Cited Faculty (Clarivate Analytics, formerly Thomson-Reuters) since 2014. He received several awards such as the Camille Dreyfus Teacher-Scholar Award and recently the NSF Creativity Award.

On the service side, he served as Associate Editor of *Nanoscale* (Royal Society of Chemistry) between 2012-2020. Currently he is on the Editorial Advisory Boards of several journals, such as *Nanoscale*, *Nanotechnology Reviews*, *Nanoscale Horizons*, *Journal of Physical Chemistry*, and *Accounts of Chemical Research*. He was also a Chair of the inaugural Gordon Research Conference on "Atomically Precise Nanochemistry" held in Texas in Feb, 2020.