

Department of Chemistry, IIT Madras
Ph.D. Research Colloquium

Investigations of atomically precise mono and multimetallic nanoclusters

Name: Esma Khatun (CY14D201)
Date: 25.09.2019

Venue: CB 310
Time: 3:00 pm

Abstract

Atomically precise analogs of noble metal nanoparticles also called as nanoclusters (NCs) have become an emerging category of nanomaterials, shown to be important in diverse applications such as sensing, catalysis, energy storage, drug delivery, cancer treatment, etc.¹ NCs have been used as nanoscale building blocks for creating solid-state materials.² Although total synthesis chemistry is less established in nanoscience, in recent years increasing research efforts are given into this field.³ Among various governing factors, the metal-ligand interface is observed to play the most important role in determining structure and property of an NC. The robust stability of some nanoclusters allows the growth of single crystals and hence, their structures can be understood by single-crystal X-ray diffraction which helps researchers in the fundamental study. Precision in their compositions and structural diversity suggest possible structure-property relationships. The properties of NCs can be greatly enriched by including various elements to make alloys. Alloying in Au and Ag NCs usually show significant effects on catalysis, optics, and so on.⁴ A wide variety of combinations and compositions are possible for the alloy NCs. Methods and conditions of preparation are responsible for the cluster structure and segregation or mixing. Intercluster reaction is found to be a new and an effective method for the synthesis of alloy NCs.⁵ Along with bimetallic NCs, tri and tetrametallic NCs are also synthesized easily by this method.

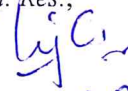
- 1 I. Chakraborty and T. Pradeep, *Chem. Rev. (Washington, DC, United States)*, 2017, **117**, 8208–8271.
- 2 P. Chakraborty, A. Nag, A. Chakraborty and T. Pradeep, *Acc. Chem. Res.*, 2019, **52**, 2–11.
- 3 Q. Yao, T. Chen, X. Yuan and J. Xie, *Acc. Chem. Res.*, 2018, **51**, 1338–1348.
- 4 S. Xie, H. Tsunoyama, W. Kurashige, Y. Negishi and T. Tsukuda, *ACS Catal.*, 2012, **2**, 1519–1523.
- 5 K. R. Krishnadas, A. Baksi, A. Ghosh, G. Natarajan, A. Som and T. Pradeep, *Acc. Chem. Res.*, 2017, **50**, 1988–1996.

Guide (Prof. T. Pradeep)




Head of the Department
தலைவர்
DEPT. OF CHEMISTRY
தொழில்நுட்ப
INDIAN INSTITUTE OF TECHNOLOGY, MADRAS
தமிழ்நாடு தொழில்நுட்ப அறிவியல் நிறுவனம், சென்னை
CHENNAI - 600 096.
தொலைபேசி - 800 992

Co-ordinator


23.09.2019