

## **Title: Poly(*N*-heterocyclic carbene)-tethered metal nanoparticles: Synthesis, characterization, and applications**

**Abstract:** Metallic nanomaterials have widespread applications across multiple areas of science and technology. Sulfur-containing ligands (thiols and thioethers) have been traditionally used as ligands to protect and functionalize these materials. *N*-Heterocyclic carbenes (NHCs) are promising alternatives to commonly employed thiols for stabilizing metal nanoparticles (NPs). The enhanced stabilization of NHC-capped NPs, due to a strong NHC-metal bond, has fueled their growing applications in nanomedicine and catalysis.<sup>1</sup> In fact, nanomaterials decorated with NHCs have been shown to withstand a variety of harsh conditions. However, such materials still suffer from limited stability in the presence of thiols, such as the biologically relevant glutathione, in aqueous media. In addition, current methods of metal NP functionalization by monomeric and dimeric NHCs, has limited scope of yielding stable coinage metal-based nanomaterials that are naturally more unstable, including AgNPs. To tackle these shortcomings, our group has recently developed novel approaches to synthesize polymerized NHC-metal complexes as precursors to metallic nanoparticles.<sup>2,3</sup> In this presentation, I will discuss some of the advances we have made in accessing such polymers. In addition, the application of these metallopolymers as substrates in the bottom-up fabrication of metal nanoparticles, their stabilities, and their catalytic activities will be discussed.

[1] Zhukhovitsky, A. V.; MacLeod, M. J.; Johnson, J. A., *Chem. Rev.* **2015**, *115*, 11503.

[2] Bélanger-Bouliga, m.; Mahious, R.; Poulomsongo, I. P.; Nazemi, A., *Dalton Trans.* **2021**, *50*, 5598.

[3] Nguyen, T. H. D.; Bélanger-Bouliga, M.; Shultz, L. R.; Maity, A.; Jurca, T.; Nazemi, A., *Chem. Mater.*, **2021**, *33*, 9588.

**Bio:** Ali completed his B.Sc. in Chemistry from K. N. Toosi University of Technology (Iran) in 2005. He then moved to Canada and completed his M.Sc. in Inorganic Chemistry at the University of Toronto with Prof. Datong Song (2009) and his Ph.D. at The University of Western Ontario with Prof. Elizabeth R. Gillies (2013). After his graduate studies, Ali first spent two years (2014–2016) in England as a Marie Curie Postdoctoral Research Fellow with Prof. Ian Manners at the University of Bristol and then came back to Canada at Queen's University (2016–2017) to work with Prof. Cathleen M. Crudden as a postdoctoral fellow. In January 2018, Ali started his independent career as an assistant professor at Université du Québec à Montréal. His group focuses on design, synthesis, and self-assembly of novel polymeric and dendritic systems to fabricate nanomaterials for applications in nanomedicine.