DEPARTMENT OF CHEMISTRY & CHEMICAL BIOLOGY

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WHAT IS ALL THE FUSS ABOUT SINGLE ATOM CATALYSIS?

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While it may seem obvious to most chemists that catalysis occurs on single sites, the mainstay of industrial heterogeneous catalysis involve supported metals, where nanoparticles of an oxide or a transition metal are supported on thermally stable supports such as silica or alumina. Here the active site is an ensemble of atoms. Hence, when it was discovered that single metal atoms could be stabilized on oxide supports and serve as catalysts, there was a lot of excitement in the catalysis community. To make these single atom catalysts practical for industrial use, it is important to tune their properties for specific reactions, and to make them stable and regenerable. This is the focus of our research at UNM. Nanoparticles are widely used on oxide supports in the petrochemical industy, automotive exhaust pollution control, in satellite thrusters and even your copy machine, to get rid of ozone. While these catalysts are useful for removing harmful pollutants, the size of the particles can grow after use at elevated temperatures, wasting the expensive and scarce metals used as active sites. The formation of large particles from atomically dispersed systems is called catalyst sintering and plagues all industrial catalysts. This presentation will describe how catalytic performance changes as the size of a nanoparticle is changed, all the way to atomic dimensions.