Gold nanostructures are very useful for their catalytic and optical properties. There is a tremendous amount of research on controlling the formation of these nanostructures in solution, using concentration, temperature, and surfactants to control morphology. However, there are benefits to forming nanostructures from vapour-phase “precursors”: this is a more ecologically friendly method that uses less chemical precursors and (typically) no solvents, and has the possibility of exhibiting finer control over the growth regime.

Research in my lab focuses on atomic layer deposition (ALD), a pulsed, layer-by-layer deposition method that allows the control of nanostructure size with Ångström precision. We have recently discovered the first ALD deposition process for gold metal deposition using a plasma-enhanced method. This and other deposition work from my lab has led to the development of gold metal nanoparticle size and shape control from vapour-phase sources.

This presentation will describe the synthesis of the gold-containing, vapour-phase precursors, the thermal testing necessary to determine their utility, and a variety of deposition conditions that have led to a variety of nanoshapes.