Abstract Submitted
for the SES19 Meeting of
The American Physical Society

Observing real time ligand-induced structural changes at the single nanocluster limit.[1] JOSEPH REINER, BOBBY COX, MADHAV GHIMIRE, MASSIMO BERTINO, Virginia Commonwealth University — Water-soluble metallic clusters are an important class of nanomaterial with applications in biosensing, diagnostic imaging and catalysis. These clusters require ligand molecules to stabilize their structure and prevent aggregation. It is not entirely clear what affect these ligands have on the cluster's structural kinetics and this has implications regarding cluster stability and reactivity. Direct observation of these fluctuations at the single cluster limit has been difficult to achieve because of the length scales involved (D_c = 2nm). To overcome this limitation, our group has utilized resistive-pulse nanopore sensing to simultaneously trap and monitor structural fluctuations of thiolate-capped gold nanoclusters at the single particle limit. The technique is based on the Coulter-counting principle applied at the nanoscale. The nanocluster enters the pore and blocks the flow of ions through the pore giving rise to a current blockade. Fluctuations within each blockade correspond to ligand induced structural changes. Here we report our observations that show the structure fluctuations scale with the size of the ligand molecules and that by trapping the cluster in the pore, we can probe and monitor surface reactions (i.e. ligand exchange) at the single cluster limit.

[1]VCU SEED

Joseph Reiner
Virginia Commonwealth University

Date submitted: 27 Sep 2019 Electronic form version 1.4