

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Deterministic Single Atom STM Tip Technology for Atomically Precise Manufacturing JOSHUA BALLARD, JUSTIN ALEXANDER, ADRIAN RADOCEA, Zyvex Labs, MAIA BISCHOF, DAVID JAEGER, University of North Texas, JOHN RANDALL, Zyvex Labs, BRIAN GORMAN, Colorado School of Mines, JIM VON EHR, Zyvex Labs, RICK REIDY, University of North Texas — Deterministic tip fabrication for Scanning Tunneling Microscopy (STM) has long been an elusive goal, where the primary method of tip preparation usually includes significant “tip conditioning” once the tip has been incorporated into the STM. We have developed a process for generating reproducible single atom tips (SATs) with a small radius of curvature (r.o.c.) of less than 10nm. First, W(111) or W(110) tips are sputter sharpened using a self-limiting process to yield with r.o.c. of <3nm; the consistent r.o.c. greatly improves the reliability of the process. Next, we use a Field Ion Microscope (FIM) to perform field evaporation and analysis of the tips. Once a clear crystal structure is determined, an SAT is formed. Transmission Electron Microscopy is used to verify that after field evaporation the r.o.c. remains small. Correlations between FIM and tip performance in STM are determined, and long term STM stability is discussed.

Joshua Ballard
Zyvex Labs

Date submitted: 19 Nov 2010

Electronic form version 1.4