Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

A kilobyte rewritable atomic memory FLORIS KALFF, MARNIX REBERGEN, NORA FAHRENFORT, JAN GIROVSKY, RANKO TOSKOVIC, Delft Univ of Tech, JOSE LADO, JOAQUN FERNNDEZ-ROSSIER, International Iberian Nanotechnology Laboratory, Portugal, SANDER OTTE, Delft Univ of Tech
— The ability to manipulate individual atoms by means of scanning tunneling microscopy (STM) opens op opportunities for storage of digital data on the atomic scale. Recent achievements in this direction include data storage based on bits encoded in the charge state (1), the magnetic state (2), or the local presence (3) of single atoms or atomic assemblies. However, a key challenge at this stage is the extension of such technologies into large-scale rewritable bit arrays. We demonstrate a digital atomic-scale memory of up to 1 kilobyte (8000 bits) using an array of individual surface vacancies in a chlorine terminated Cu(100) surface (4). The chlorine vacancies are found to be stable at temperatures up to 77 K. The memory, crafted using scanning tunneling microscopy at low temperature, can be read and re-written automatically by means of atomic-scale markers, and offers an areal density of 502 Terabits per square inch, outperforming state-of-the-art hard disk drives by three orders of magnitude. 1. J. Repp et al., Science 305, 493–5 (2004) 2. S. Loth et al., Science 335, 196–9 (2012) 3. R. Bennewitz et al., Nanotechnology 13, 499 (2002) 4. F. E. Kalff et al., Nature Nanotechnology 11, 926–9 (2016)

Floris Kalff
Delft Univ of Tech

Date submitted: 12 Nov 2016 Electronic form version 1.4