Abstract Submitted
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Oxidation of atomic scale patterns prepared by scanning probe techniques[1] KAI LI, NAMBOODIRI PRADEEP, JOSEPH FU, LEI CHEN, RICHARD SILVER, National Institute of Standards and Technology, NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY TEAM — Scanning probes offer a potential alternative technology pathway in practical atomic scale devices and developing atom-based dimensional standards. However, the process steps, such as atomic scale lithography and subsequent pattern transfer need considerable optimization before the technology can be utilized for manufacturing applications. Nanoscale patterns are prepared in UHV on a hydrogen passivated silicon surface using STM by selectively removing H atoms. These patterns can then be used for further chemical processing such as oxidation and RIE. Conventional Si oxidation processes that require a high temperature and moisture-rich environment are known to damage the hydrogen-protected area. The challenge is to produce a strong SiO_2 hard etch mask on the patterned area without affecting the hydrogen passivation layer. Currently we are developing a new low temperature oxidation process that starts with exposing the patterned areas to oxide/moisture at temperatures below H desorption. The presentation will focus on the details of near atomic scale oxide chemistry relevant to processing nanoscale patterns. We will also present our approach to fabricating stable, atomically defined calibration standards based on the crystal lattice.

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