Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

In-situ growth of two-terminal silicon nanowires from locally heated cantilevers CHRISTIAN KALLESOE, DTU Nanotech, Technical University of Denmark, FRANCES ROSS, CHEN-YEN WEN, IBM TJ Watson Research Center, KRISTIAN MOLHAVE, PETER BOGGILD, DTU Nanotech, Technical University of Denmark — Resistively heated crystalline silicon cantilevers extending over the edge of a chip offer excellent control of local growth of nanowires, without heating the entire micro-system. Besides being CMOS compatible, the cantilevers also have a rapid temperature cycling, and furthermore the freestanding cantilevers are suitable for in-situ studies of nanowire growth inside a TEM, offering the possibility of applying electrical fields to direct the growth and growing bridging wires between cantilevers thereby making two-terminal in-situ electrical measurements of nanowires possible. We have used such cantilever loops to study the growth of nanowires in-situ in UHVTEM. Epitaxial growth was observed from the crystalline cantilevers and the rapid temperature cycling ensured a very fast reaction time when crystallizing or melting the catalytic particle. The silicon wires were grown towards a cold cantilever loop, thereby forming bridging nanowires and the nanowire contact was seen to depend on the wetting ability of the gold catalytic particle to the cold cantilever. Furthermore various two-terminal measurements were performed on the bridging silicon nanowires in-situ in UHV.

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Date submitted: 24 Nov 2008 Electronic form version 1.4