Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Impurity-mediated early charge density wave condensation in the oxygen-adsorbed In/Si(111)-(4×1)/(8×2) nanowire array STEFAN WIPPERMANN, Max-Planck-Institut fuer Eisenforschung, ANDREAS LUECKE, WOLF GERO SCHMIDT, Paderborn University, DEOK MAHN OH, HAN WOONG YEOM, Pohang University — The self-assembled In/Si(111)-(4x1) nanowire array is an extremely popular model system for one-dimensional electronic systems and features a reversible temperature-induced phase transition into a charge density wave (CDW) ordered ground state. While impurities have been widely known to affect this phase transition, the atomistic mechanisms have rarely been elucidated. Here we present a joint experimental and *first principles* study, demonstrating oxygen impurity atoms to condense the In/Si(111) nanowire array locally into its CDW ground state, even above the transition temperature. Interestingly, CDW ordering is induced only by a concerted effect of multiple impurities. The mechanism is explained as a subtle interplay between coherent superposition of local impurity-induced lattice strain, a strong coupling between electronic and lattice degrees of freedom, and phononic effects on the free energy. Funding from DFG FOR1700 is gratefully acknowledged.

Stefan Wippermann
Max-Planck-Institut fuer Eisenforschung

Date submitted: 06 Nov 2015 Electronic form version 1.4