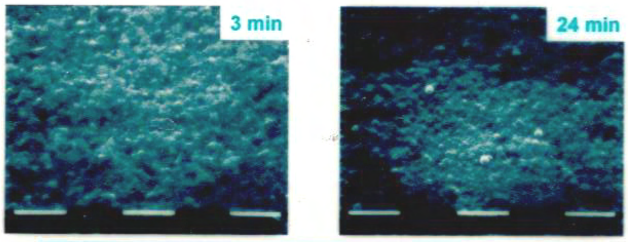
Silicon Deposition on Mo



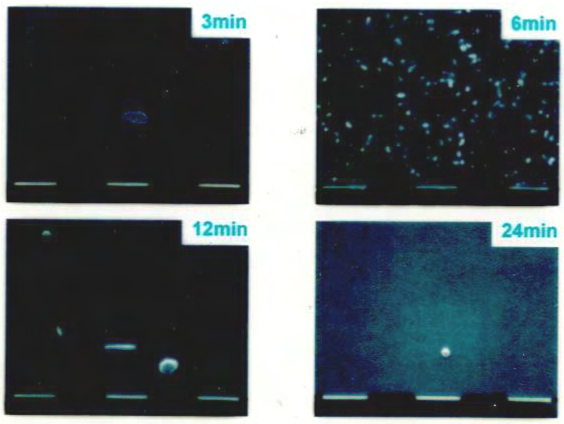
SEG condition[950 °C, SiH_4:HCl:H_2 = 1:2:97, 100 Torr]

Weight measurement of silicon films

mg/cm^2

Time (min)	3	6	12	24
Mo	**0.15**	**0.19**	**0.19**	**0.24**
Pt	**0.19**	**0.20**	**0.25**	**0.34**

Silicon Coarsening & Etching on SiO_2



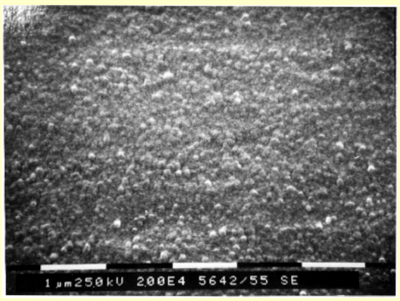
SEG condition[950 °C, SiH_4:HCl:H_2 = 1:2:97, 100 Torr]

Cheong et al.
J. Crystal Growth
206 (1999) 177

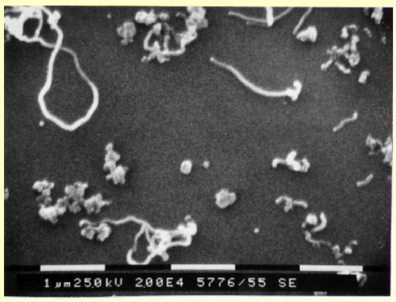
We grow nanowires, nanotubes and various nanostructures by CVD. Would they also grow by charged nanoparticles?

Charged Clusters have difficulty in landing on insulators.

→ Selective Deposition in CVD process



(a) Mo substrate

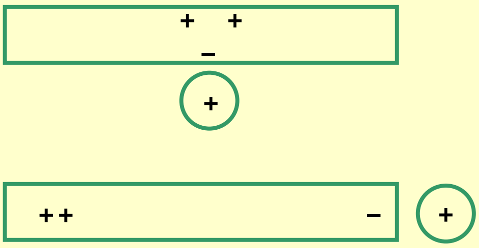


(b) Si substrate

SiH_4 : HCl : H_2 = 3 : 1 : 96, 950^{o}C, 10 Torr, 3 min

Hwang et al. : J. Crystal Growth, 218 (2000) 33

Coulomb interaction between positively-charged rod and cluster

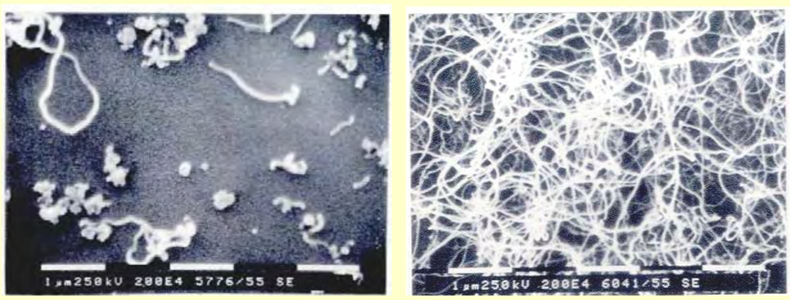


Radial direction
→ Repulsive

Axial direction
→ Attractive

→ One-dimensional nanowire growth

Silicon Nanowires

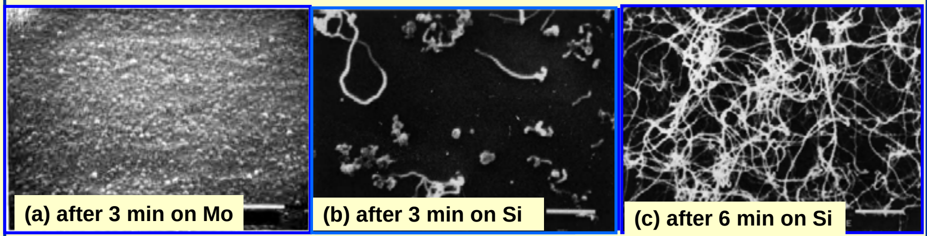


(a) 3 min (b) 6 min

SiH_4 : HCl : H_2 = 3 : 1 : 96, 950^{o}C, 10 Torr, Si substrate

Hwang et al. : J. Crystal Growth, 218 (2000) 33

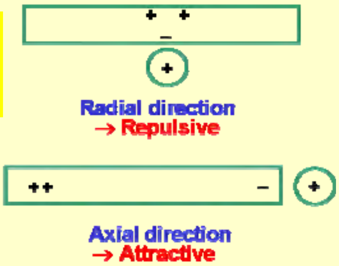
Selective Deposition and Nanowire Growth by Charged NPs



Conductor (Mo) Insulator (SiO_2)

CNPs have difficulty in landing on insulators.
→ **Selective Deposition**
J. Crystal Growth, 206 (1999) 177

Electrostatic Interaction between CNPs and charged rods
→ **Nanowire Growth**
J. Crystal Growth, 218 (2000) 33



SiH_4 : HCl : H_2 = 3 : 1 : 96, 950^{o}C, 10 Torr

Rev. Mod. Phys., Vol. 77, No. 2, April 2005

Colloquium: Reactive plasmas as a versatile nanofabrication tool
K. Ostrikov*
School of Physics, The University of Sydney, Sydney NSW 2006, Australia

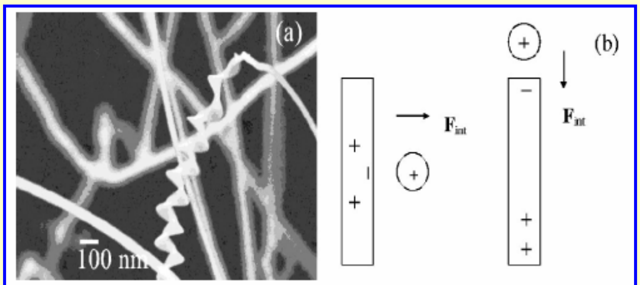


FIG. 9. Silicon nanowire growth and interaction with charged clusters: (a) Scanning electron micrograph of silicon nanowires grown in low-pressure SiH_4+H_2 reactive plasma (Xu, Ostrikov, *et al.*, 2005); (b) schematics of the charged nanocluster-nanowire interaction (Hwang and Kim, 2004). Here, $\mathbf{F}_{int}$ denotes the force of the electrostatic building-unit–nanowire interaction.

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Role of electric field on formation of silicon nanowires

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(Received 20 January 2003; accepted 28 April 2003)

An electric-field mechanism has been developed to explain the oxide-assisted growth of silicon nanowires. This mechanism assumes a strong electric field at the tip of silicon nanowires. Most of the SiO molecules would be attracted by this electric field and then land on the nanowire tip. Thus, the silicon nanowire growth is restricted at the tip only. The maximum electric field that could possibly exist has been estimated from the field emission data. The probability of SiO vapor landing on the nanowire tip is calculated for a wide range of conditions. The result shows that for a sufficiently strong electric field, all SiO vapor would land on the nanowire tip. This attractive force to the nanowire tip is even more pronounced if the SiO vapor first condenses to form a larger cluster. All these calculation results suggest that this electric-field mechanism is possible. [DOI: 10.1063/1.1583155]

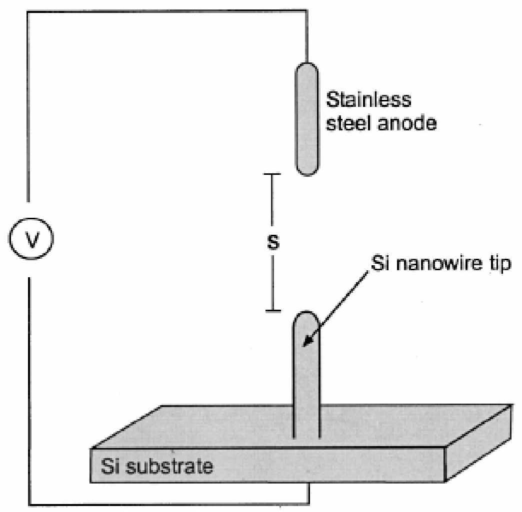

FIG. 1. Schematic diagram showing a Si nanowire tip and the anode for field-emission measurement.

1192 J. Appl. Phys., Vol. 94, No. 2, 15 July 2003 S. Cheng and H. Cheung

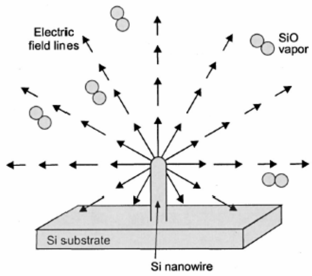

FIG. 3. Electric field originates from the Si nanowire tips.

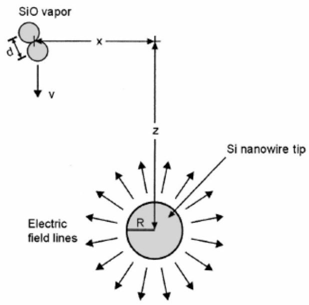

FIG. 4. Geometry of SiO vapor falling on a nanowire tip.

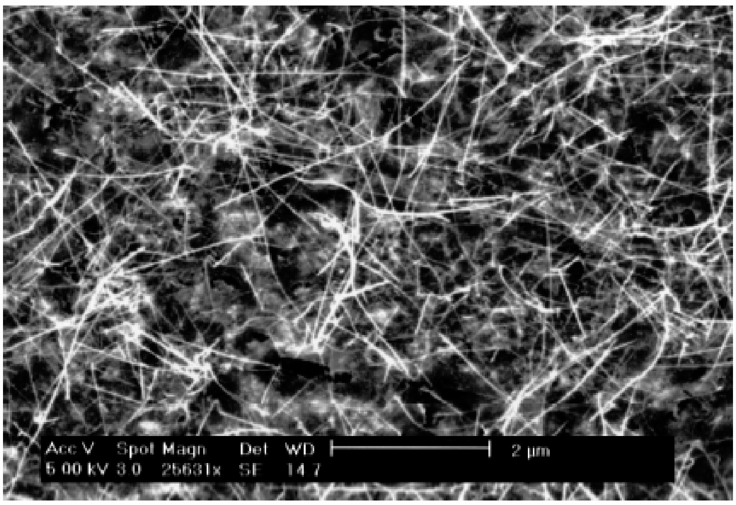

Fig. 2. SEM image of the GaN nanowires on the substrate.

H.Y. Peng et al. / Chemical Physics Letters 327 (2000) 263–270

Spontaneous Polarization-Induced Nanohelixes, Nanosprings, and Nanorings of Piezoelectric Nanobelts

Xiang Yang Kong and Zhong Lin Wang*

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Vol. 3, No. 12
1625−1631

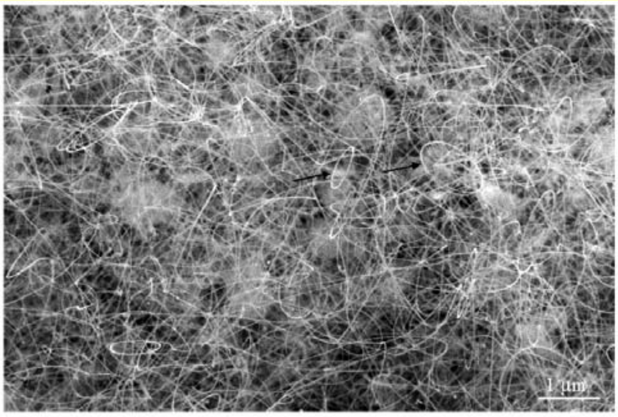

Figure 1. SEM images of the as-synthesized ZnO nanobelts, showing nanobelts of sizes 20−60 nm in widths and a large fraction of nanorings and helical nanostructures.

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Formation of Piezoelectric Single-Crystal Nanorings and Nanobows

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Contribution from the School of Materials Science and Engineering and School of Chemistry and Biochemistry, Georgia Institute of Technology, Atlanta, Georgia 30332-0245

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Abstract: Bending of polar-surface-dominated (PSD) nanobelts of ZnO can be explained by one of two processes: electrostatic neutralization of the dipole moment via deformation (called an electrostatic polar charge model) or imbalances between surface tensions via surface-termination induced stresses. This article presents experimental data on the structural features of *nanorings* and *nanobows* formed by bending single-crystal, PSD ZnO nanobelts. Our data exclusively support the electrostatic polar charge model as the dominant mechanism for bending.