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Seeded silicon nanowire growth catalyzed by commercially available bulk metals: broad selection of metal catalysts, superior field emission performance, and versatile nanowire/metal architectures

Fang-Wei Yuan, Hong-Jie Yang, and Hsing-Yu Tuan*

Department of Chemical Engineering, National Tsing Hua University, 101, Section 2, Kuang-Fu Road, Taiwan 30013

Supporting Information.

Supplementary Tables

Table S1. Quantitative XPS analysis result of metal substrates

Atomic (%)	**Cu**	**Al**	**Ti**	**Pb**	**Ag**	**Fe**	**Ni**	**Au**	**Zn**
copper substrate	> 99.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
alumium substrate	<0.1	> 99.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
titanium substrate	<0.1	<0.1	> 99.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
lead substrate	<0.1	<0.1	<0.1	> 99.9	<0.1	<0.1	<0.1	<0.1	<0.1
silver substrate	<0.1	<0.1	<0.1	<0.1	> 99.9	<0.1	<0.1	<0.1	<0.1
iron substrate	<0.1	<0.1	<0.1	<0.1	<0.1	> 99.9	<0.1	<0.1	<0.1
nickel substrate	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	> 99.9	<0.1	<0.1

Supplementary Figures

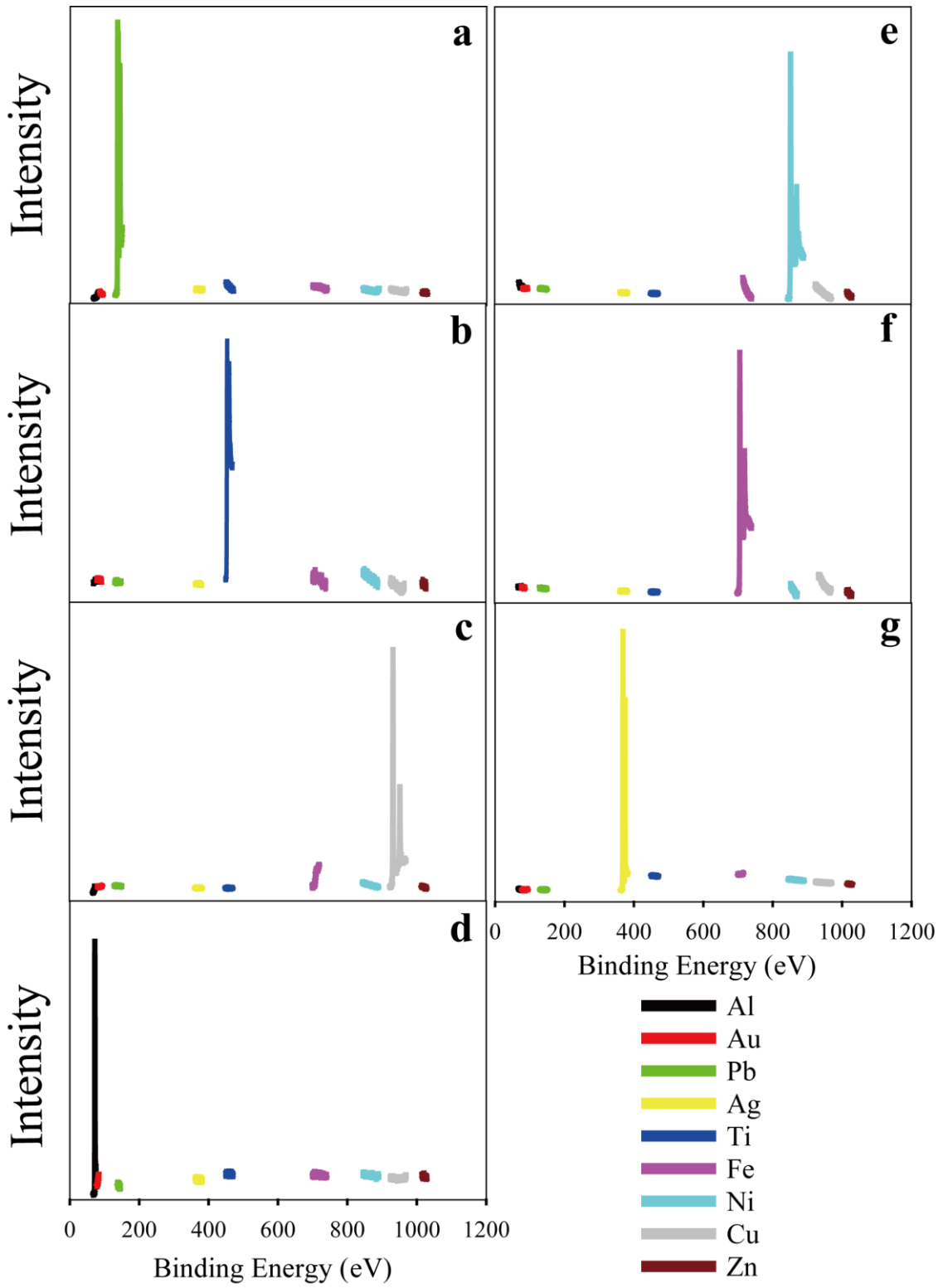

Figure S1. XPS spectrum of a (a) Pb, (b) Ti, (c) Cu, (d) Al, (e) Ni, (f) Fe, and (g) Ag substrate, respectively.

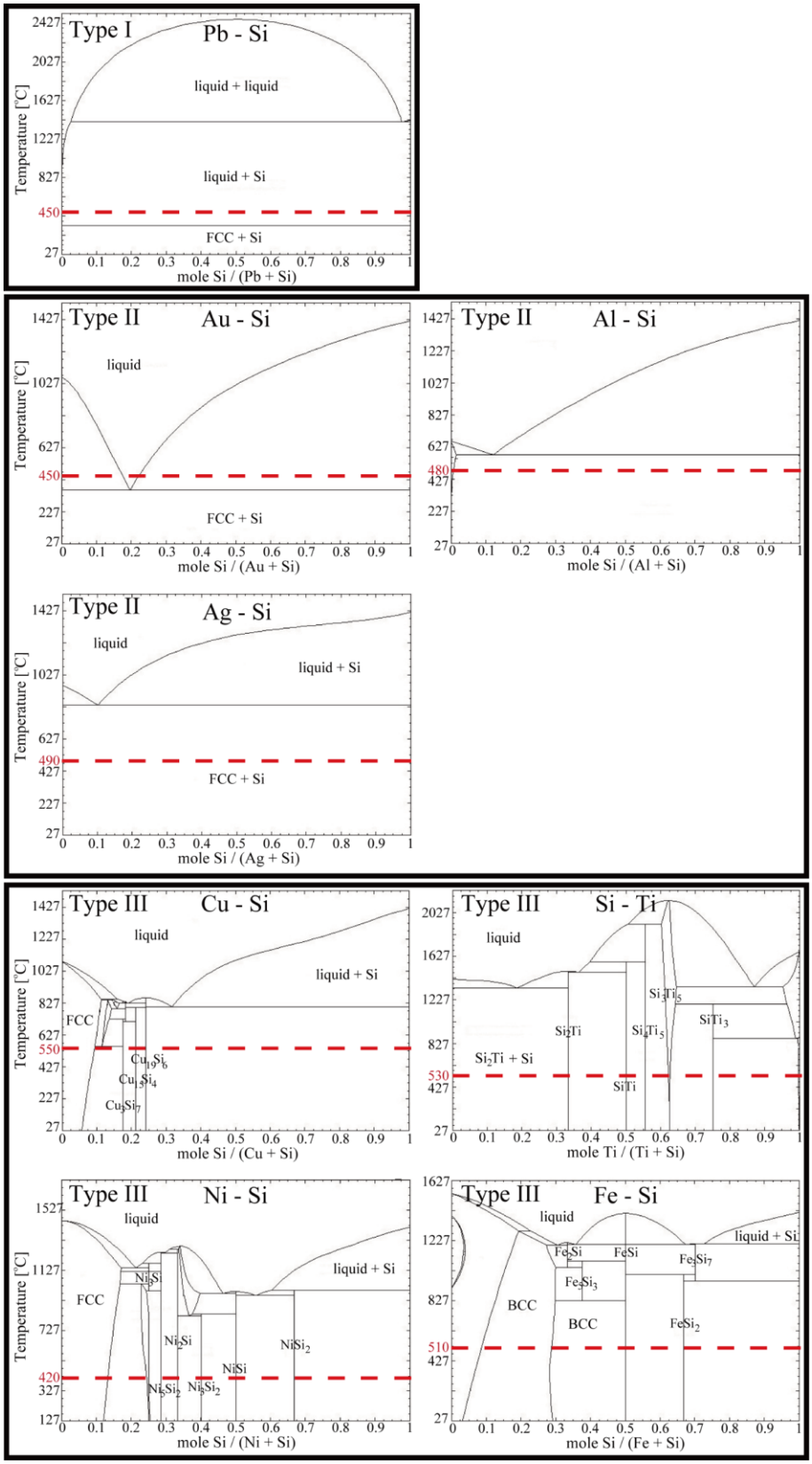

Figure S2. Metal/Si phase diagrams of metals explored in this study.[1] The type notion refers to the classification as shown in Figure 1. The reactions temperatures for Si nanowire synthesis are marked in red dotted line.

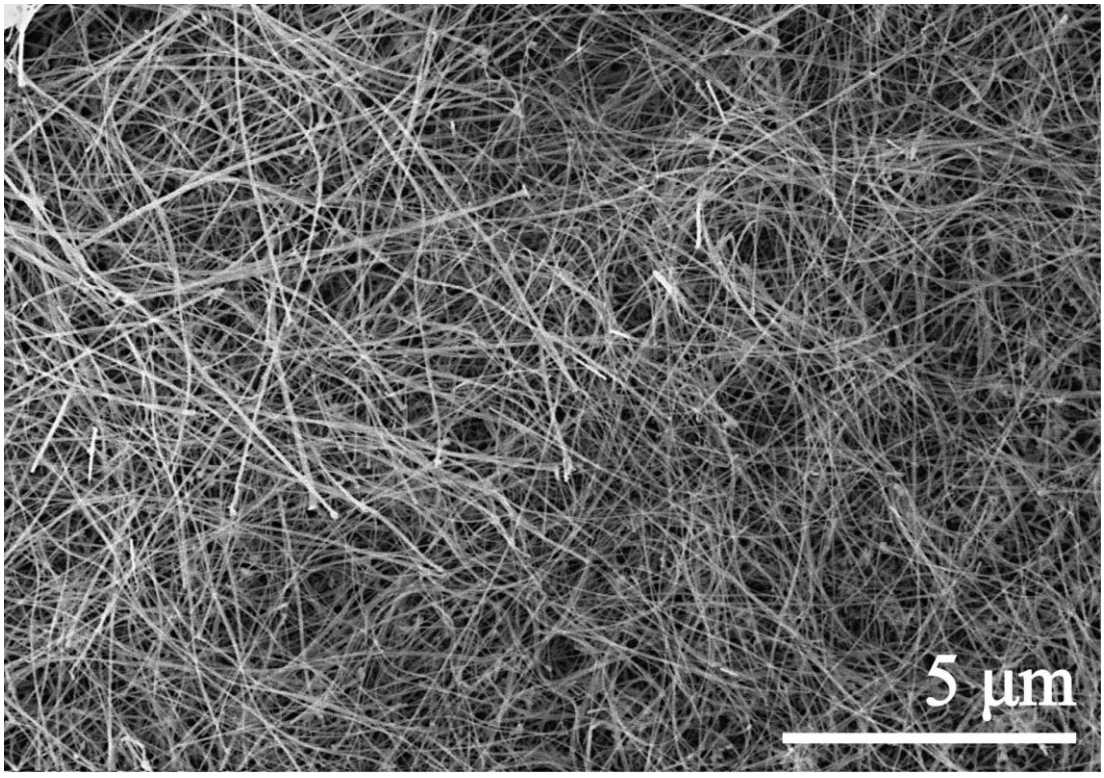

Figure S3. HRSEM image of Si nanowires grown on a Al substrate.

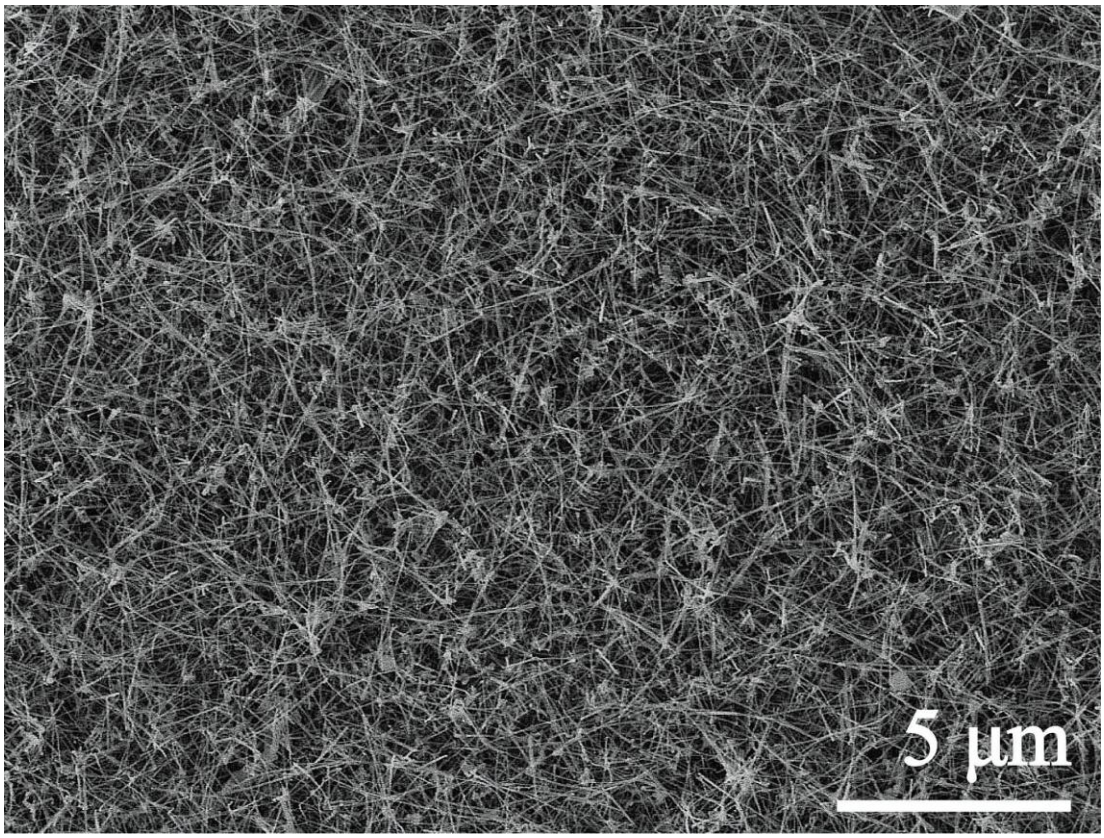

Figure S4. HRSEM image of Si nanowires grown on a Cu substrate.

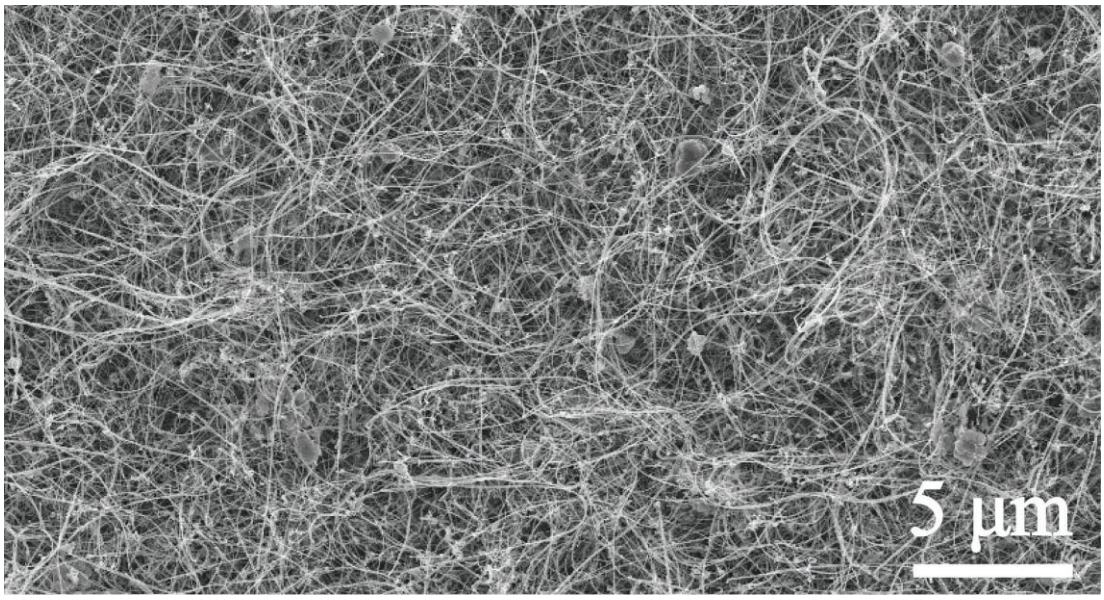

Figure S5. HRSEM images of Si nanowires grown on a Ti substrate.

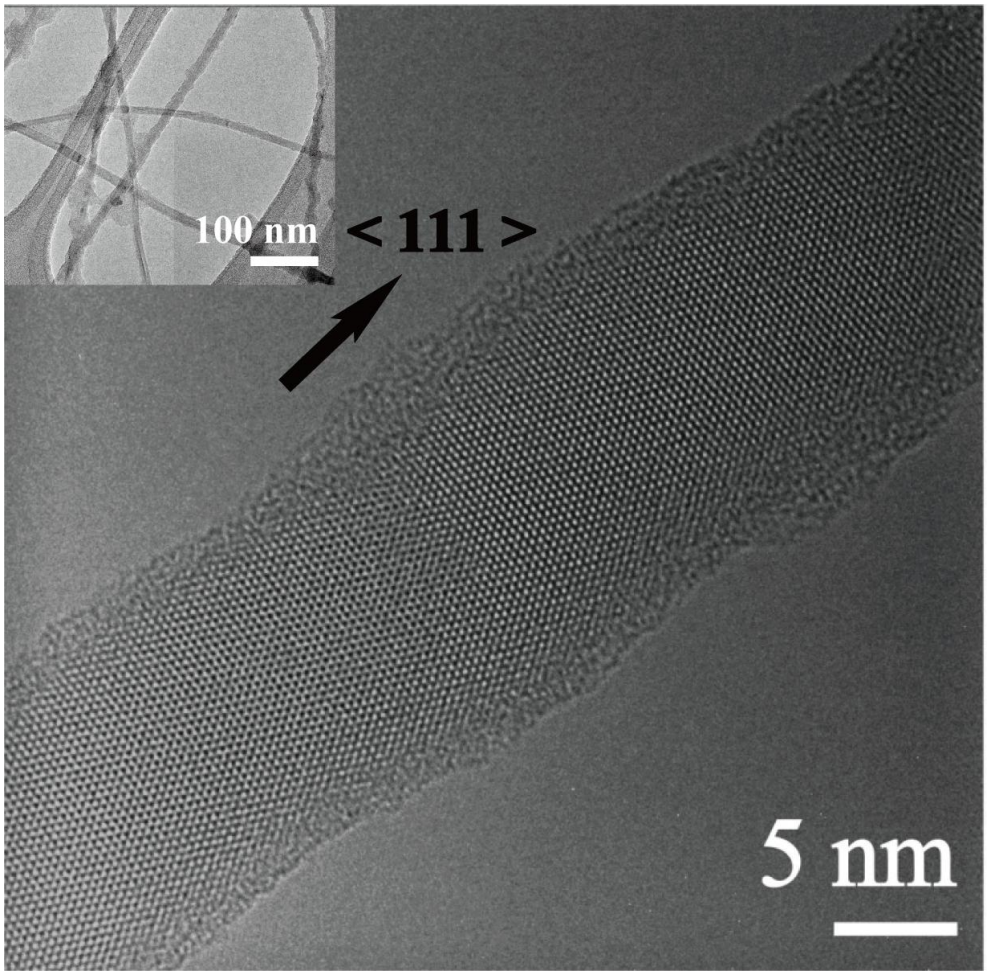

Figure S6. TEM images of Si nanowires grown from a Pb substrate in supercritical benzene. Inset: low resolution TEM image of Si nanowires.

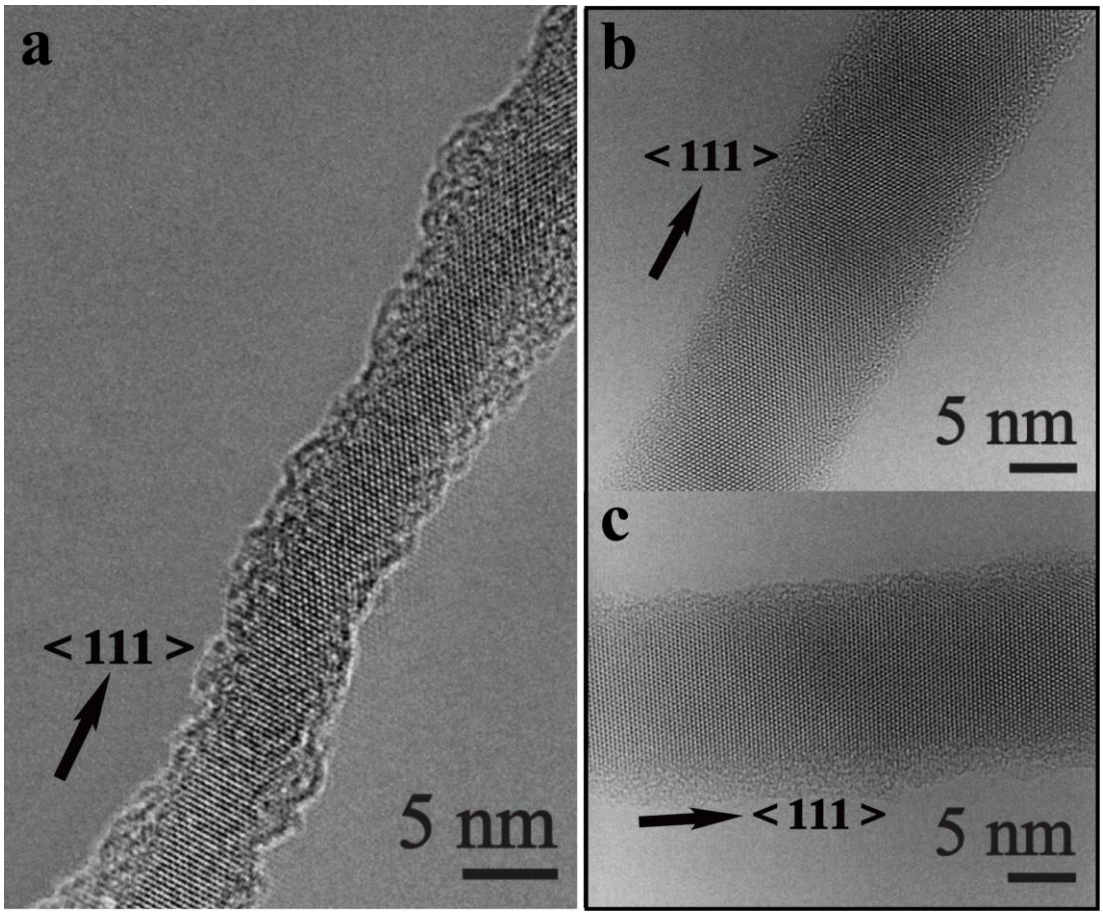

Figure S7. HRTEM images of single-crystalline Si nanowires grown from a (a) Al and (b, c) Ag substrate, respectively.

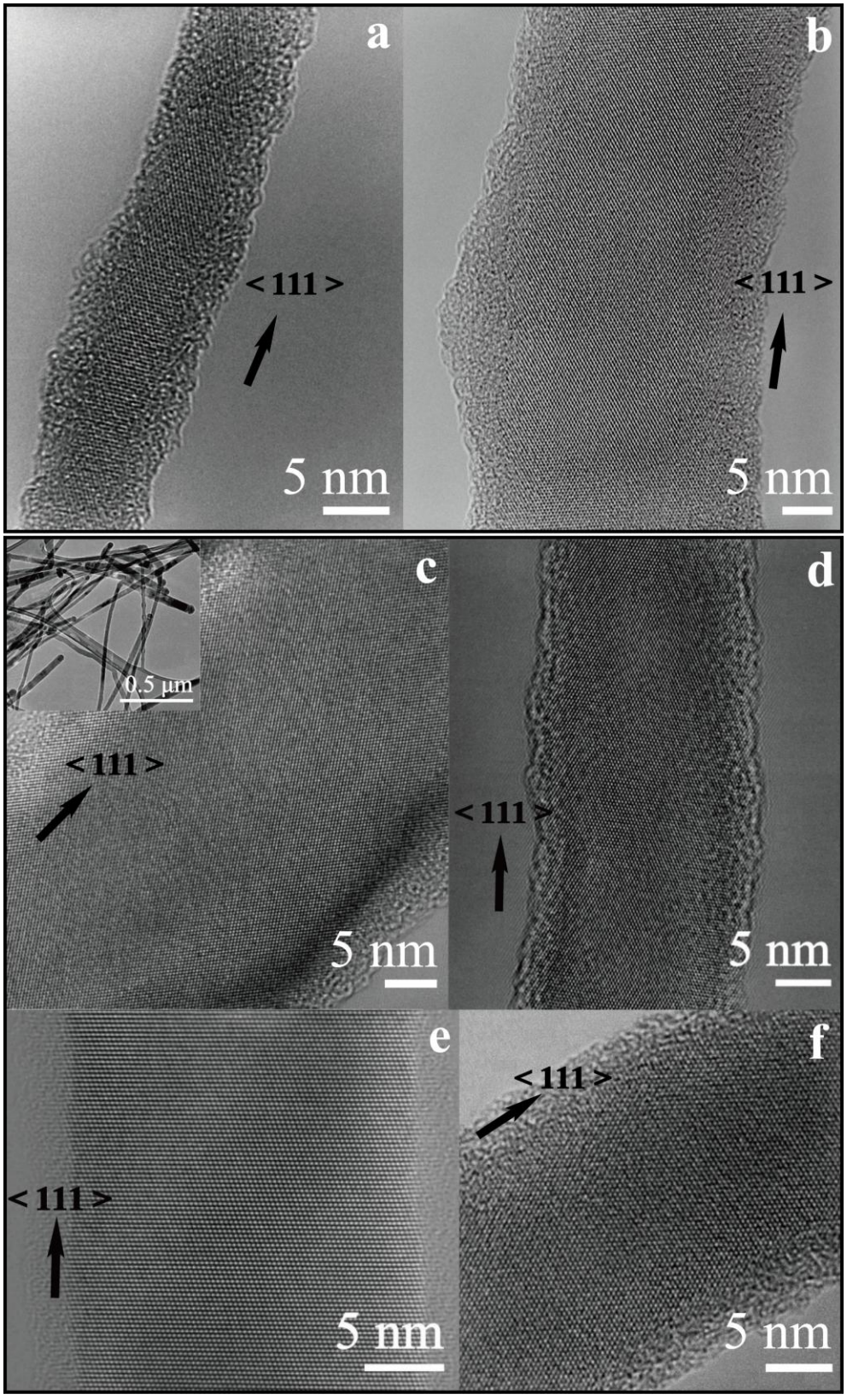

Figure S8. HRTEM images of single-crystalline Si nanowires grown from a (a, b) Ti and (c-f) Cu substrate, respectively. Inset: low resolution TEM image of Si nanowires.

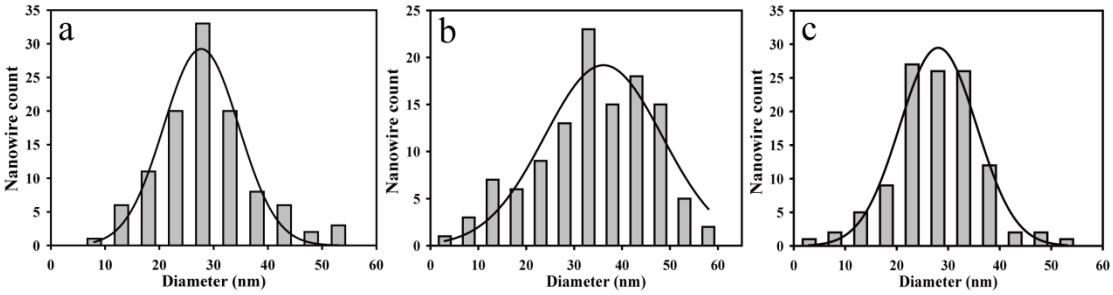

Figure S9. Size histograms of Si nanowires grown from (a) Cu, (b) Al, and (c) Ti metal substrates, respectively. The solid lines show a Gaussian fit of the nanowire distributions. The average diameter (standard deviation): 28.6 ± 8.8 nm, 34.2 ± 11.9 nm, and 27.8 ± 8.3 nm for Cu-, Al-, and Ti- seeded reactions, respectively.

Reference:

1. Thaddeus, B. M.; Hiroaki, O. S. P. R.; Linda, K. Binary Alloy Phase Diagram, 2nd ed.; ASM Internation: Materials Park, OH, 1990; Vol. 1.