

## Supporting Information for

### A Facile Route to Synthesis Silica Shell Free Silicide Nanowires

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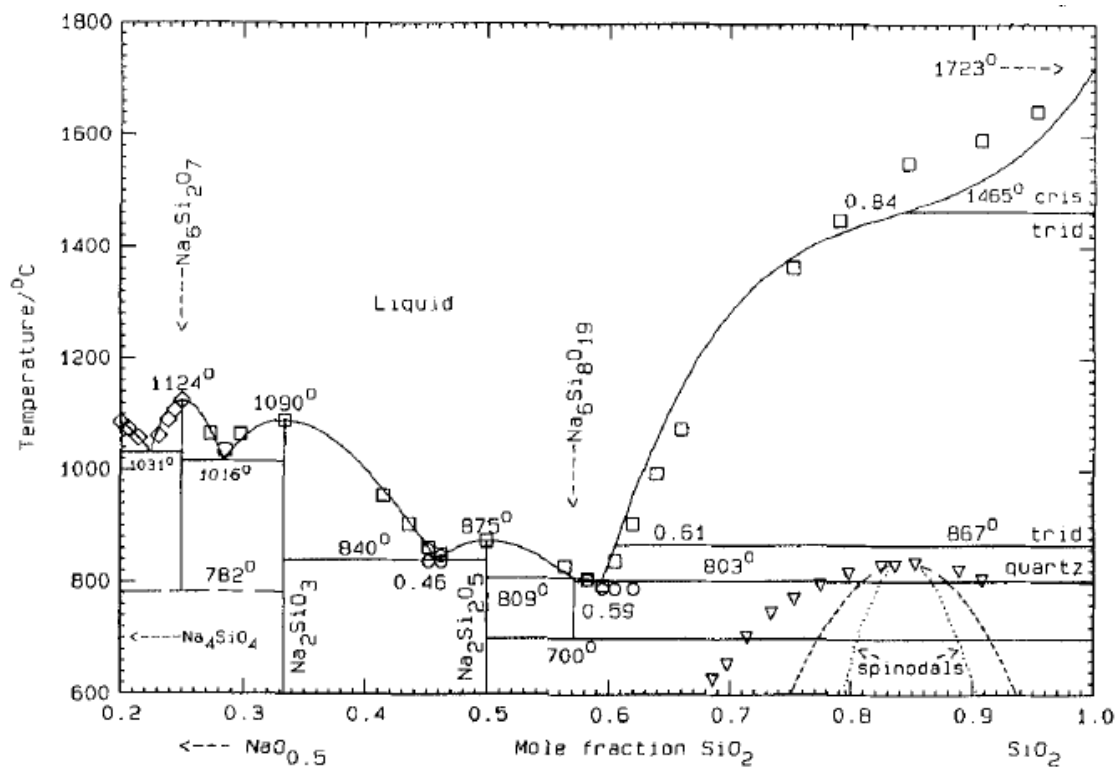
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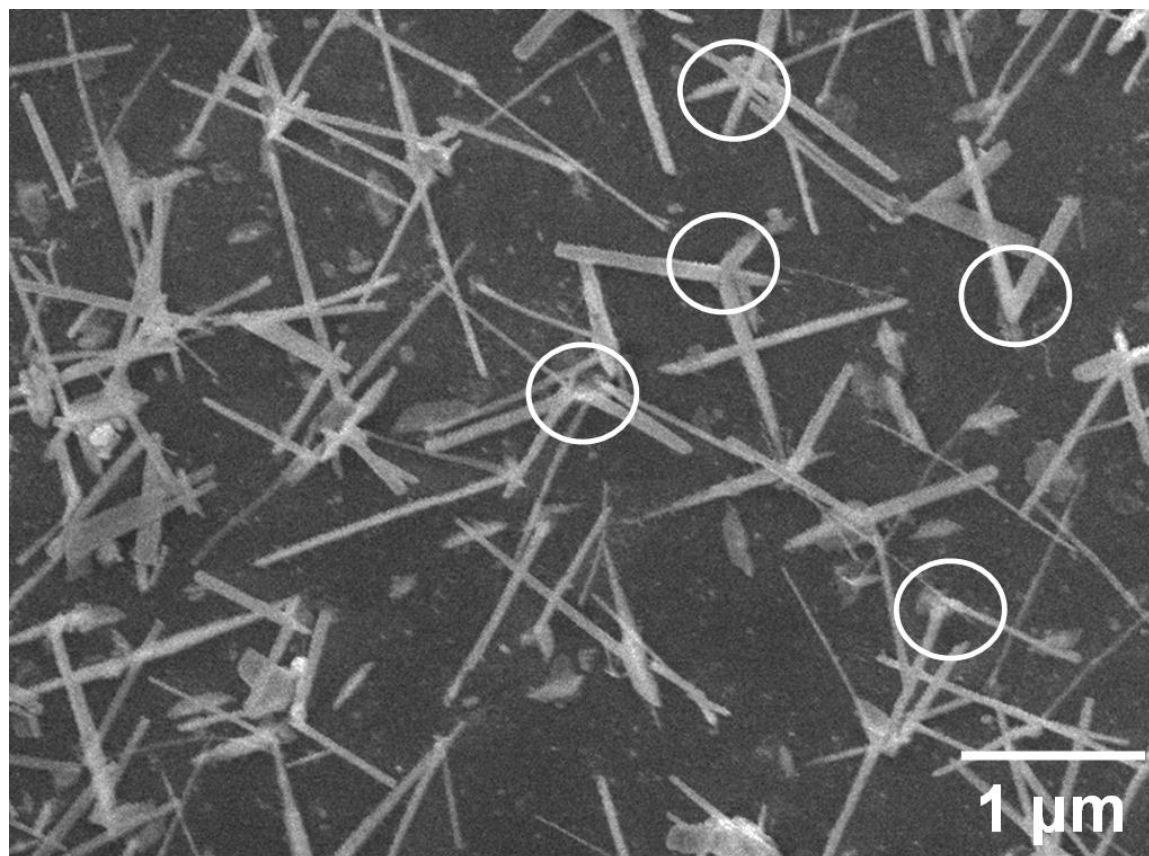
#### Syntheses and characterizations of GdSi<sub>2</sub> NWs

GdSi<sub>2</sub> nanostructures were synthesized between 800 °C and 850 °C with the similar setup for ErSi<sub>2</sub> NWs as described in the experimental section. The reaction temperature strongly affects the GdSi<sub>2</sub> nanostructure morphologies. At low reaction temperature (800 °C), high aspect ratio, vicinal GdSi<sub>2</sub> NWs (~10 nm width and several micron length) grew on the Si (001) surface (Figure S4a). An increase in the reaction temperature to 820 °C induced the formation of low aspect ratio, vicinal GdSi<sub>2</sub> nanorods (~80 nm widths and 1 micron length) (Figure S4b). If the reaction temperature was even higher at 850 °C, due to the high deposition rate of gadolinium, large particles covered the silicon surface and inhibited the growth of contacted silicide nanostructures (Figure S4c).

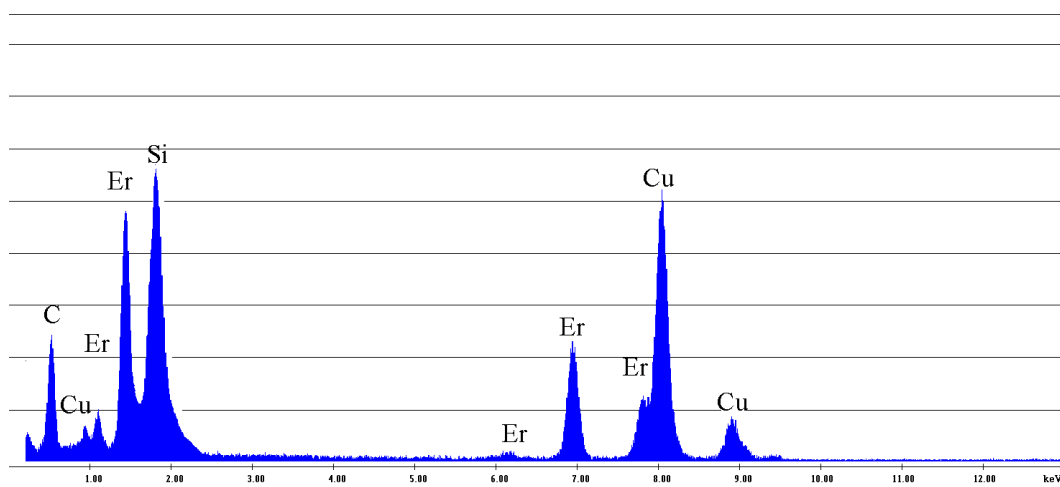
Free-standing GdSi<sub>2</sub> NWs were obtained by lengthening the reaction time. These free-standing NWs were then collected by scratching the silicon substrate surface and dispersing them into IPA solution for TEM characterizations.



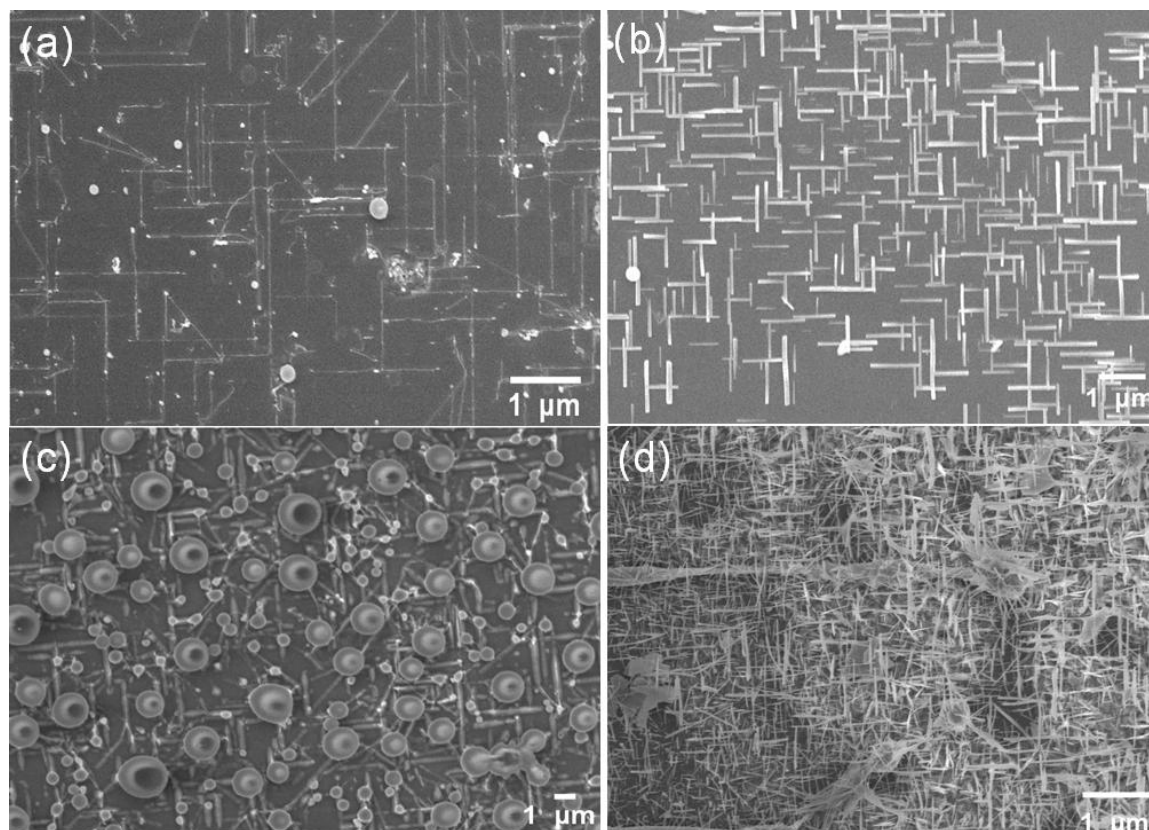
**Figure S1.** Phase diagram of system Na<sub>2</sub>O-SiO<sub>2</sub>.



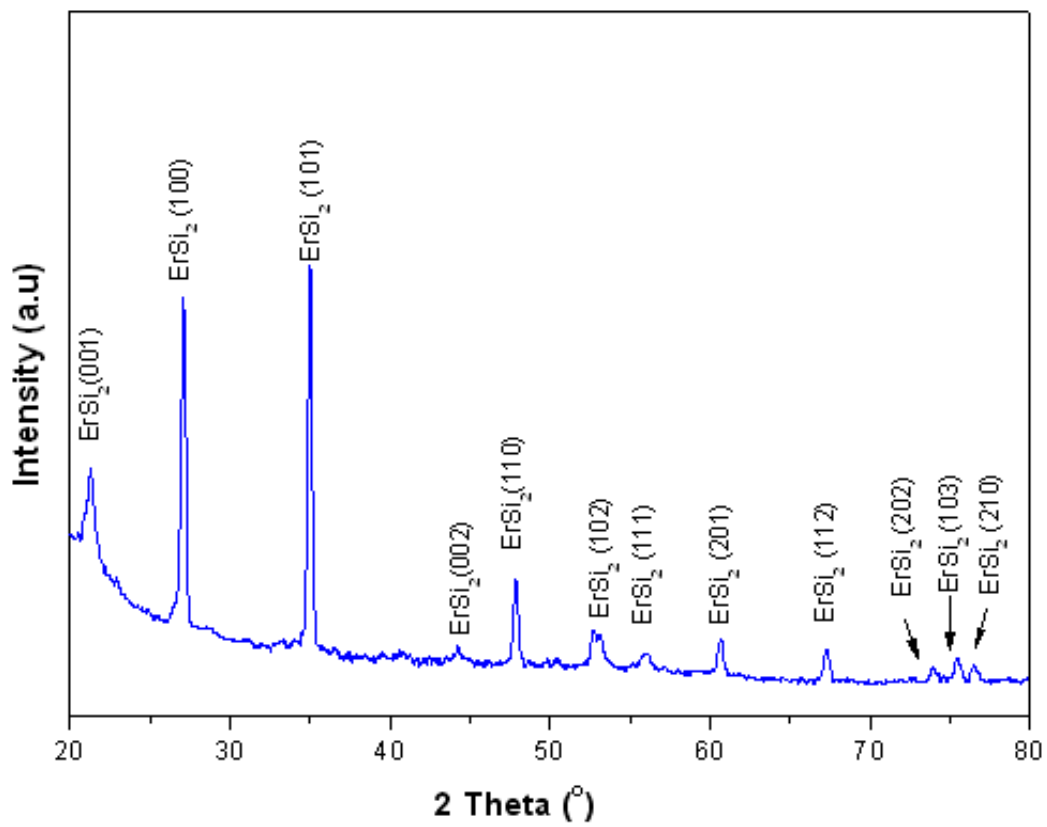
**Figure S2.** FESEM image of  $\text{ErSi}_2$  NWs grown on Si(001) surface at  $820^\circ\text{C}$  for 1.5 h. The twinned NWs are circled.



**Figure S3.** Energy dispersive spectra of ErSi<sub>2</sub> NWs. No impurities were detected.



**Figure S4.** FESEM images of the GdSi<sub>2</sub> NWs grown on Si (001) surface at different temperature and reaction time. The synthesis was carried out at (a) 800 °C for 1 h, (b) 820 °C for 1 h, and (c) 850 °C, 1 h. Micron sized particles covered the silicon surface. (d) GdSi<sub>2</sub> NW sample was grown on Si (001) at 820 °C for 5h.



**Figure S5.** XRD pattern of the  $\text{ErSi}_2$  nanostructures grown on Si (111) wafer.