Supporting information

Interfacial intermixing of Ge/Si core–shell nanowires by thermal annealing

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Figure S1 shows SEM images of *i*-Ge/*p*-Si core–shell NWs at 700 ˚C after different annealing times. The results clearly show that the NW structures did not collapse when the annealing time was increased from 1 min to 20 min.

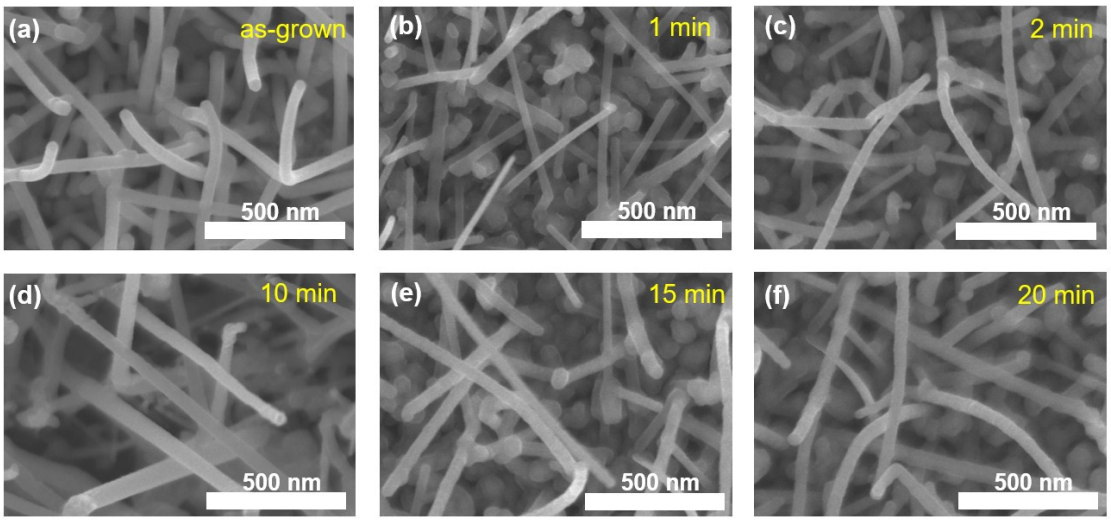

Figure S1. SEM images of *i*-Ge/*p*-Si NWs at 700 °C with different annealing times observed from (a) as-grown, annealing for (b) 1 min, (c) 2 min, (d) 10 min, (e) 15 min, and (f) 20 min.

The high-resolution TEM images in Figures S2a,b, show an as-grown sample of *i*-Ge/*p*-Si core–shell NWs, which have a single-crystal structure and a sharp interface

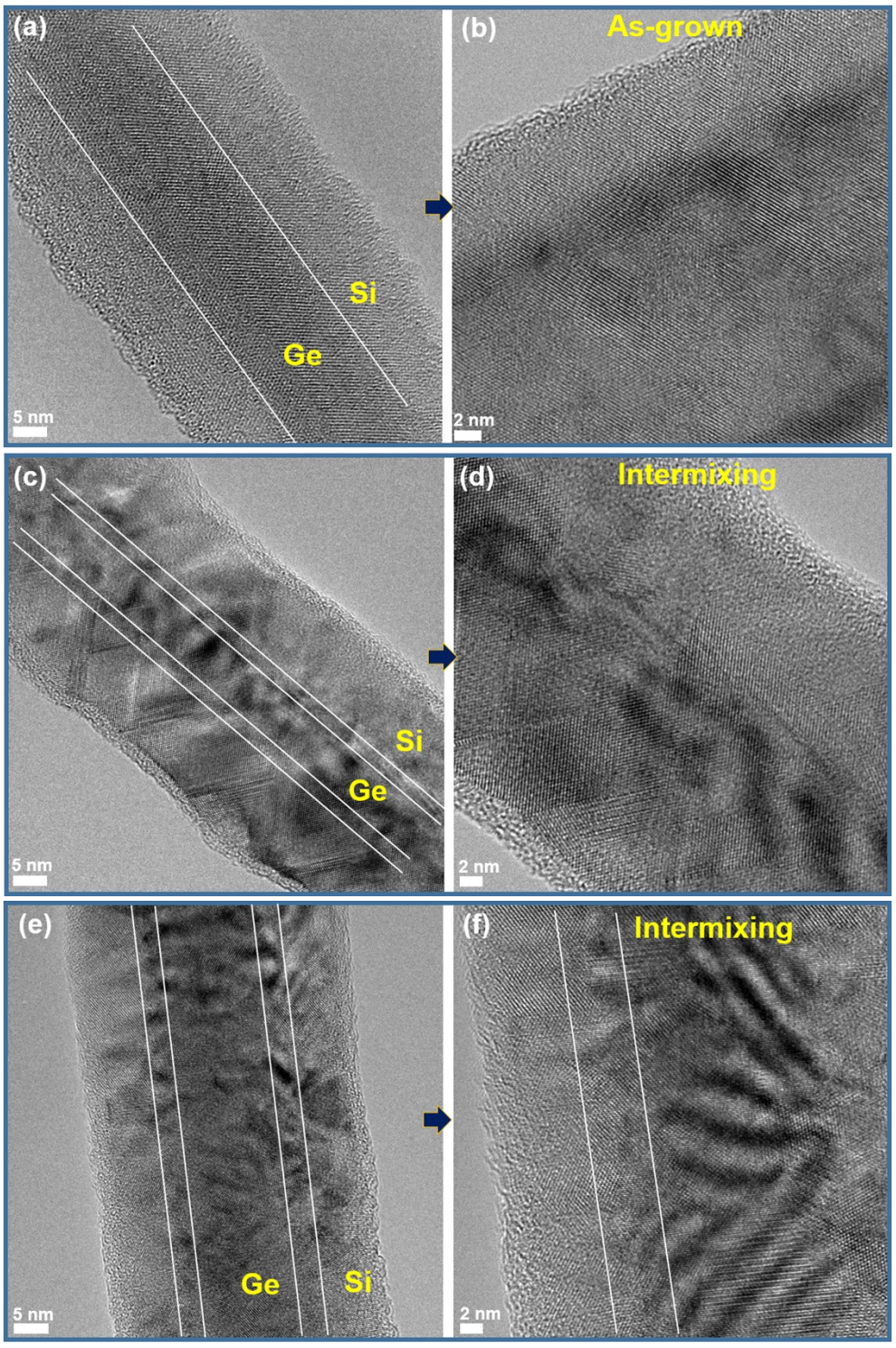

Figure S2. TEM images of *i*-Ge/*p*-Si core–shell NWs observed for (a,b) no intermixed sample, (b-f) intermixed sample.

between the Ge and Si layers. After annealing for 10 min at 700 ˚C, the samples were shown to adopt a polystal structure due to the intermixing process, as shown in Figures S2c-f.

Figure S3 shows a comparison of line scanning of *i*-Ge/*p*-Si core–shell NWs with and without annealing. The as-grown sample clearly shows core–shell structure, as shown in Figure S3a. However, an unsharp core–shell structure is observed in the annealing sample due to the formation of intermixing, as shown in Figure S3b. The intensity of Si element is higher than Ge element at the center region (dark dotted line), demonstrating the high content of Si atoms in Ge core region. The result further confirms that Si atoms can diffuse easily than Ge atoms.

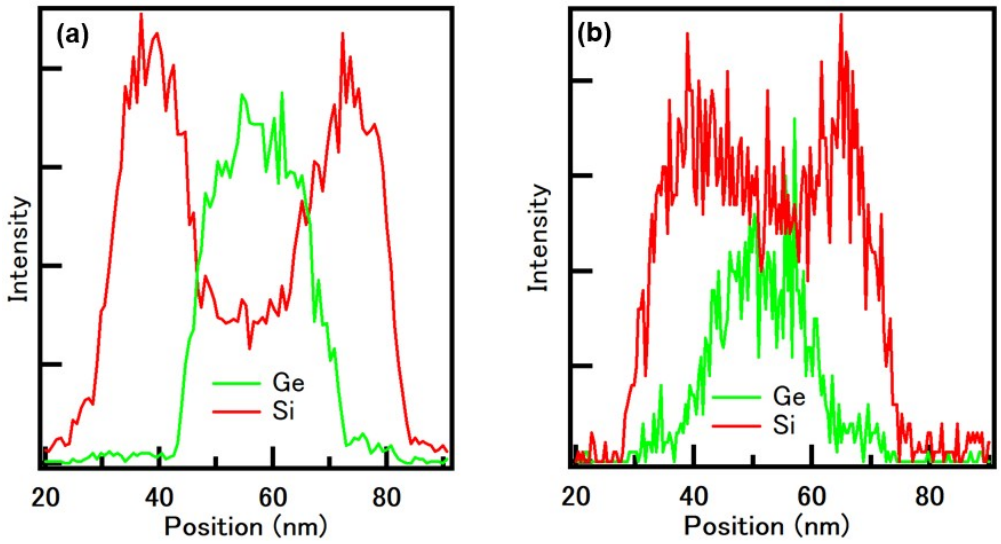

Figure S3. Line scanneing of i-Ge/p-Si core–shell NWs (a) before annealing, and (b) after annealing at 700 ˚C for 10 min.