

Sn-guided defect-free GeSn lateral growth on Si by molecular beam epitaxy

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Figure S1a-f presents SEM images of GSMs at different Ge deposition temperature (235 °C, 250 °C, 300 °C, 400 °C, 450 °C and 500 °C, respectively) with the other experimental parameters fixed.

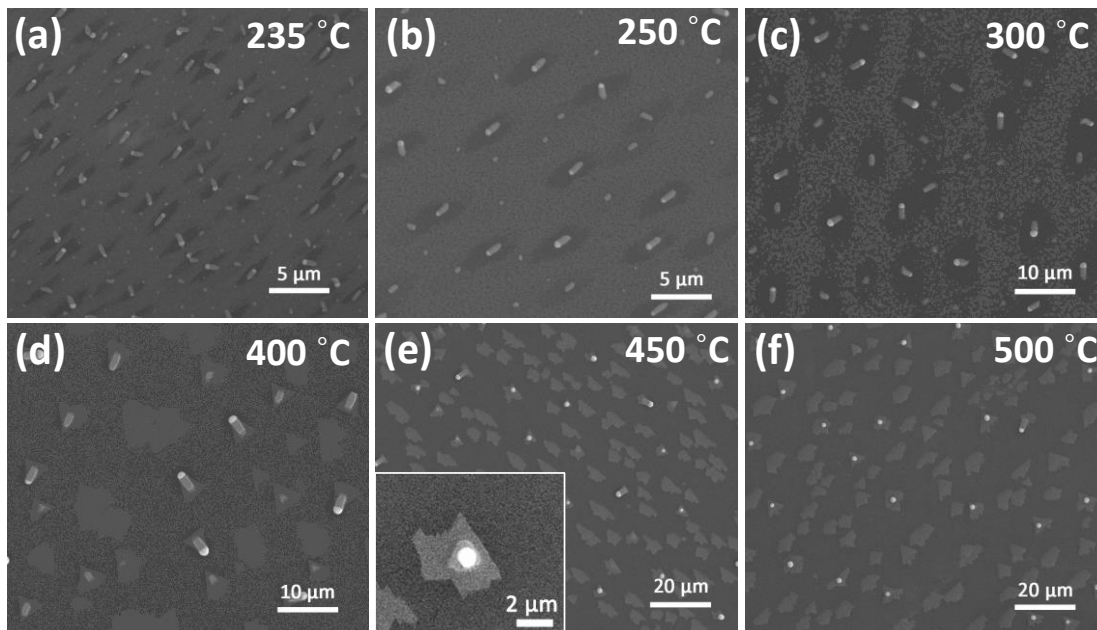


Figure S1. (a)-(f) SEM images of GSMs grown with Ge epitaxial temperature of 235 °C, 250 °C, 300 °C, 400 °C, 450 °C and 500 °C, respectively.

Figure S2a-f presents the GSMs grown with gradually increasing Ge deposition duration (5 min, 10 min, 30 min, 60 min, 120 min and 180 min, respectively). Other experimental parameters are fixed.

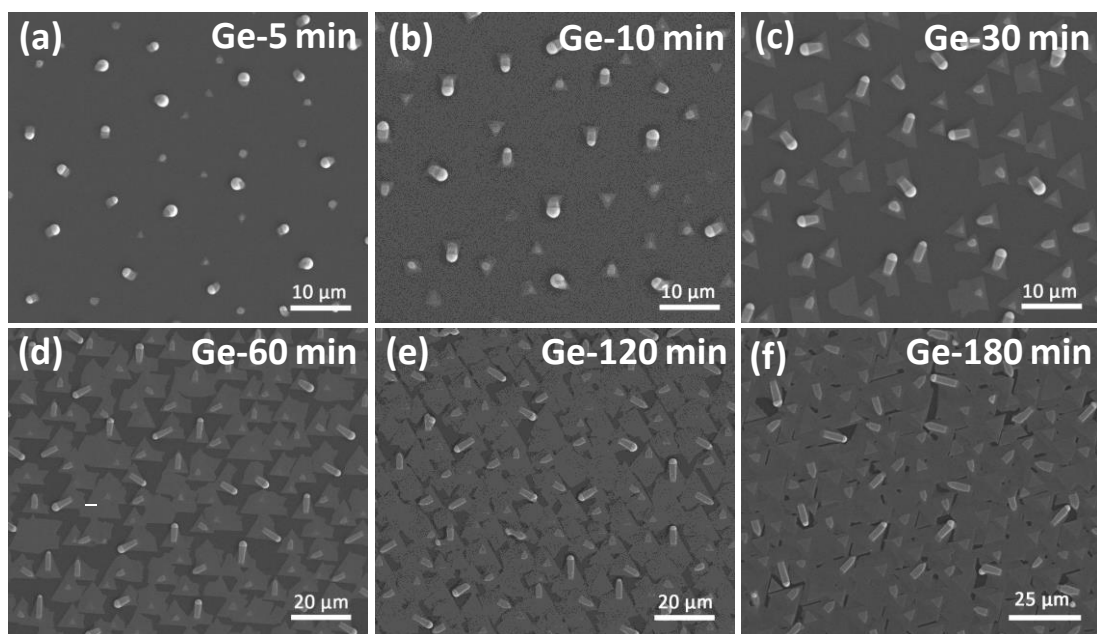


Figure S2. (a)-(f) SEM images of GSMs grown with Ge deposition of 5 min, 10 min, 30 min, 60min, 120min and 180min with Ge epitaxial temperature at 400 °C and Sn deposition duration of 30 min.

Figure S3a-d presents SEM images of GSMs at different Sn deposition amounts (Deposition durations are 5 min, 10 min, 20 min and 30 min, respectively) with the other experimental parameters fixed.

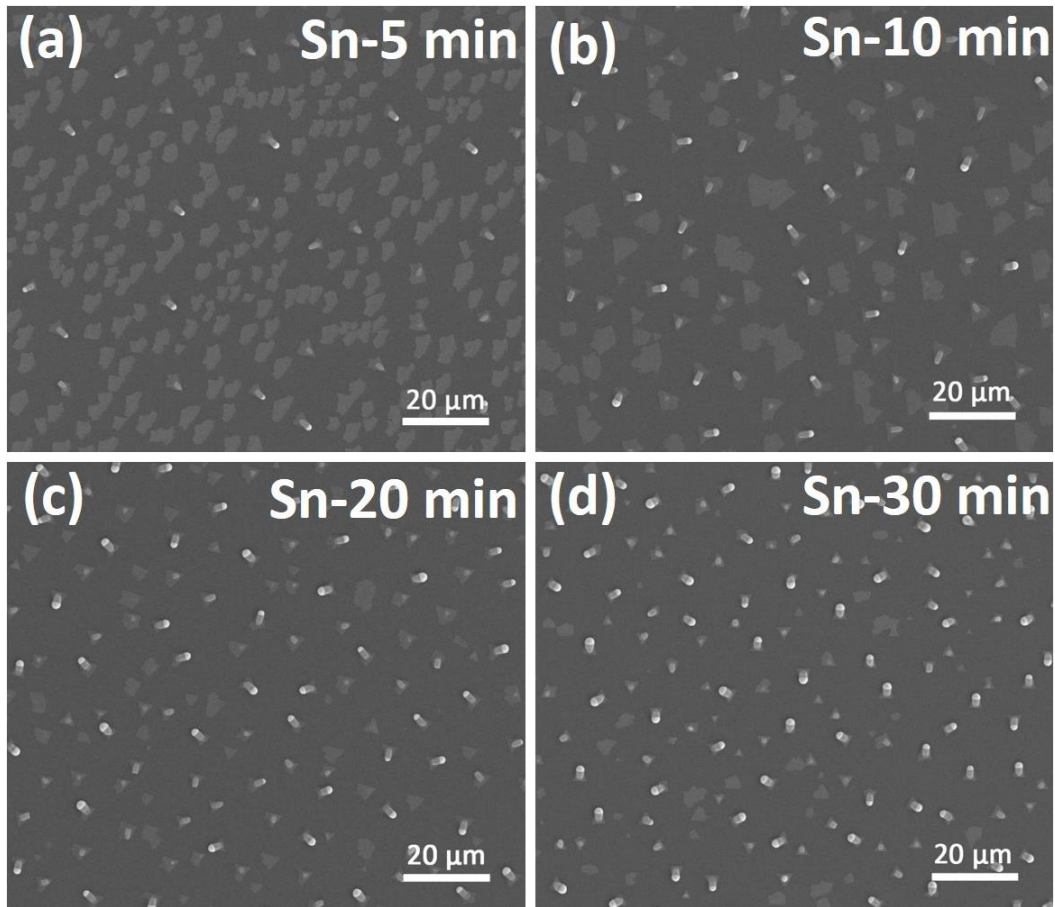


Figure S3. (a)-(d) SEM images of GSMs grown with Sn deposition of 5 min, 10 min, 20 min and 30min, with Ge epitaxial temperature at 400 °C and duration of 10 min.

Figure S4 shows the results obtained at the Ge epitaxial temperature of 200 °C. No Sn-guided growth were observed.

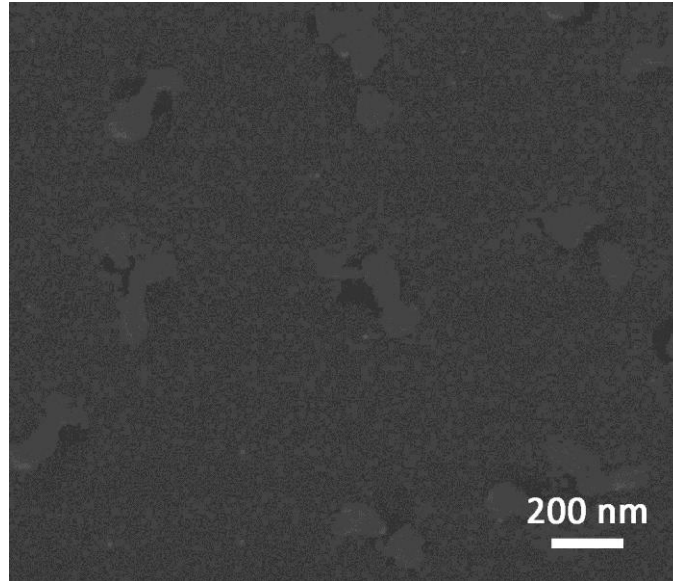


Figure S4. Sn-guided Ge epitaxial growth at 200 °C.

During the annealing process, Sn films would gather to hemispheres, and the widths of the GSMs are mainly determined by the diameters of annealed Sn particles. As presented in Figure S5, the diameters of annealed Sn particles (Figure S5a) are similar to the widths of resultant GAMs (Figure S5b).

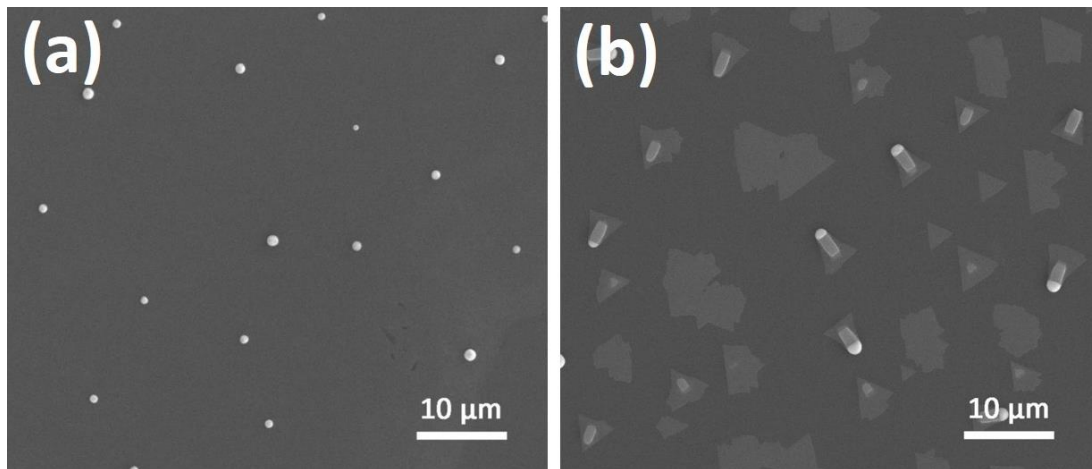


Figure S5. (a) Sn films annealed at 400 °C for 5min in vacuum before Ge deposition; (b) the resultant GSMs using Sn particles in (a) as guidance.