Supporting information

Quantitative Determination of How Growth Conditions Affect the 3D Composition of InGaAs Nanowires

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Experimental section

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Figure S1. (a) GaAs substrate with free standing InGaAs nanowires. (b) Copper stubs. (c). APT specimen by directly attaching substrate onto the stubs with high vacuum silver expoxy.

Figure S1 clearly illustrates the procedure of our field of view (FOV) enhanced specimen preparation method. To begin with, the substrate with free-standing nanowire can be split by a diamond scriber into small pieces smaller than 2 mm2, and can be attached onto a copper stub with high vacuum silver epoxy. After examination in the SEM, the ideal sample with intact nanowires standing on the middle region of the substrate can be directly transferred into the chamber for APT experiments.

However, due to the small size of the nanowire tips, it is impossible to observe the nanowire tip with the optical camera equipped on the APT, however, laser reflection still can be observed if the laser targets on the nanowire tip. Therefore, the specimen and electrode alignment is carried out by pre-opening the laser pulse and moving the stage until laser reflection can be observed.

The APT data collecting was assisted with 3 pJ laser energy and 200kHz repetition rate at the low temperature 20K. After a decent volume of dataset has been collected, we deliberately stop the experiment early to prevent sample rupture. By comparing the tip image before and after the APT experiment in the SEM, we can estimate the length of nanowire consumed during APT experiment, which can be helpful to the subsequent shank angle-based reconstruction methods. The shank angle can be accurately measured in the SEM before APT experiment.

Table S1. Dimensions of ten randomly selected nanowires from sample A, B and C

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Nanowire dimensions (um) | | | | | | |
|  | Sample A | | Sample B | | Sample C | |
| No. | Height | Width (base) | Height | Width (base) | Height | Width (base) |
| #1 | ~7.75 | ~0.47 | ~12.45 | ~0.75 | ~39.83 | ~2.17 |
| #2 | ~7.65 | ~0.44 | ~12.81 | ~0.80 | ~39.99 | ~2.15 |
| #3 | ~7.63 | ~0.45 | ~12.78 | ~0.72 | ~39.40 | ~2.14 |
| #4 | ~7.72 | ~0.43 | ~12.74 | ~0.82 | ~38.94 | ~2.11 |
| #5 | ~7.69 | ~0.44 | ~12.66 | ~0.79 | ~39.45 | ~2.13 |
| #6 | ~7.70 | ~0.45 | ~12.97 | ~0.74 | ~40.49 | ~2.16 |
| #7 | ~7.68 | ~0.45 | ~12.94 | ~0.82 | ~39.56 | ~2.09 |
| #8 | ~7.71 | ~0.50 | ~12.93 | ~0.81 | ~39.42 | ~2.11 |
| #9 | ~7.68 | ~0.49 | ~12.84 | ~0.76 | ~40.01 | ~2.13 |
| #10 | ~7.78 | ~0.52 | ~12.85 | ~0.74 | ~39.63 | ~2.15 |



Figure S2. In compositional distribution along the radial direction of (a) sample A, (b) sample B and (c) sample C



Figure S3. 1D axial composition analysis of additional nanowires from sample A. (a) Sample No. 2, (b) sample No. 3, and (c) sample No. 4. (Results of #1 were given in the manuscript)



Figure S4. 1D axial composition analysis of additional nanowires from sample B. (a) Sample No. 2 and (b) sample No. 3. (Results of #1 were given in the manuscript)



Figure S5. 1D axial composition analysis of additional nanowires from sample C. (a) Sample No. 2 and (b) sample No. 3. (Results of #1 were given in the manuscript)



Figure S6. A comparation of 1D axial composition between Sample A, B and C at core, 112A facet and 112B facet respectively. (#1)