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Ultra-thin InAs Nanowire Growth and Au Atom Diffusion on the Indium-Rich Surfaces

(Supplementary Information)

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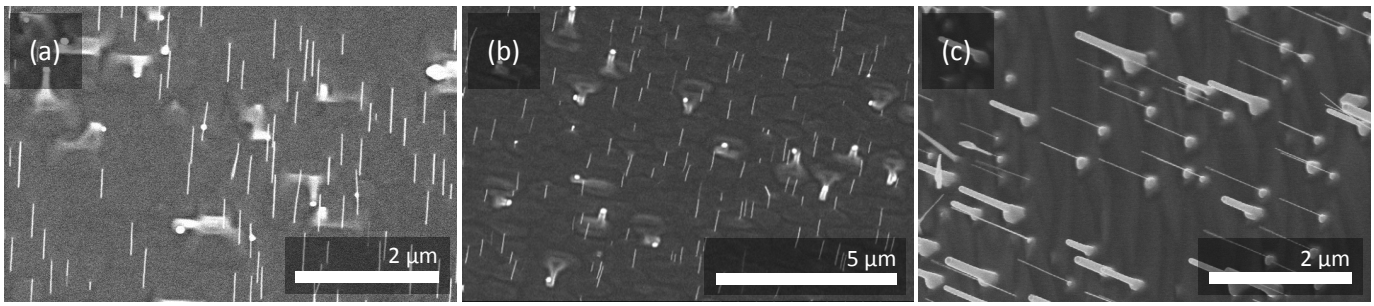

Figure S1. SEM images showing bimodal NW growth on InAs (100) substrates using (a) 50 nm and (b) 100 nm Au nanoparticles. (c) The same growth condition using 50 nm Au colloids, but on (110) substrates. (a) and (b) are top view images whereas (c) shows a 35° tilted view

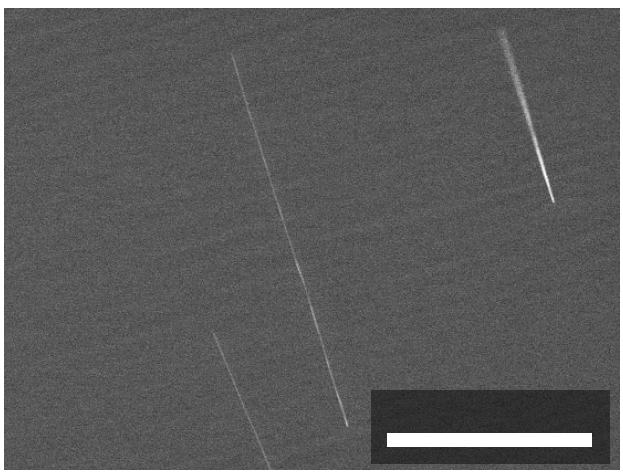

Figure S2. SEM image of an ultrathin InAs NW with 3 μm length and no noticeable tapering.

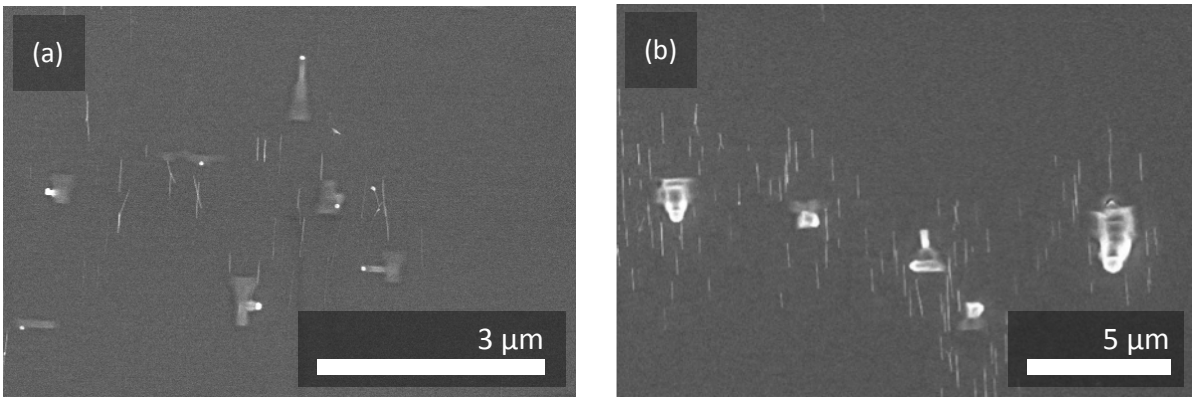

Figure S3. Proximity effect. SEM images showing the proximity effect of ultrathin InAs nanowire growth, which only takes place adjacent to the large Au nanoparticles dispersed on InAs (100) substrates. The originally deposited Au nanoparticles are (a) 50 nm and (b) 250 nm in diameter. In order to see the proximity effect more clearly, poly-l-lysine was not used for the samples shown above to decrease the density of the large Au nanoparticles.

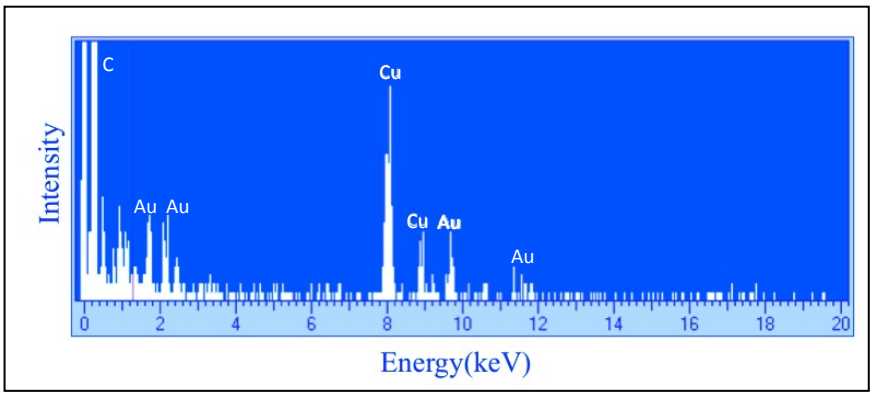

Figure S4. EDX spectrum obtained via point analysis at the tip of an ultrathin InAs nanowire, confirming a purely Au composition. Note that the Cu peaks are from the Cu-based TEM grid.

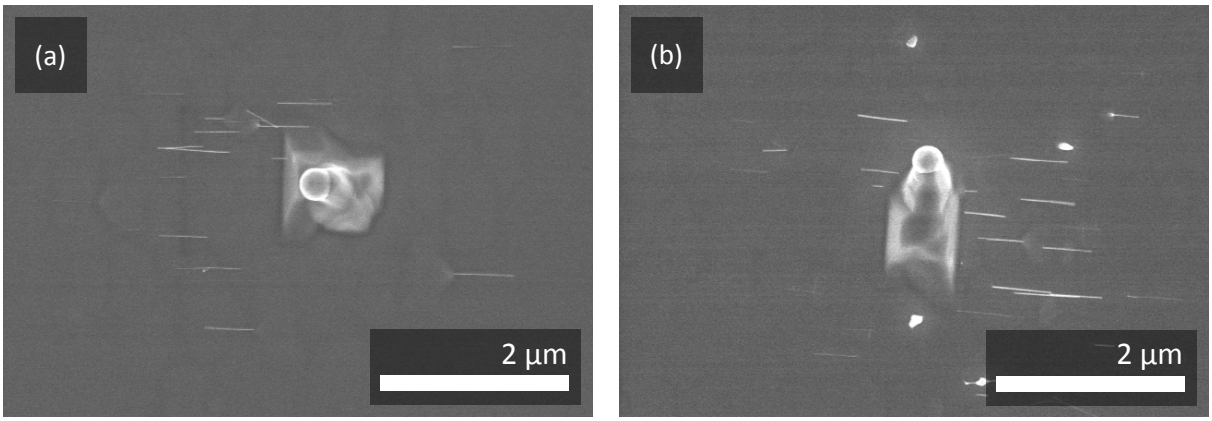

Figure S5. SEM images showing ultrathin InAs NWs grown (a) without holding temperature and (b) with holding temperature at the growth condition for 15 minutes.

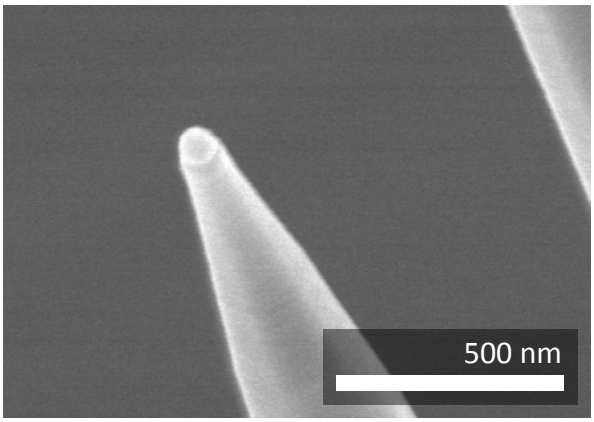

Figure S6. SEM image of InAs NW grown using a 50 nm Au colloid on InAs (110) for 1 hour and 40 minutes. No change is found in the size of the original Au particle.

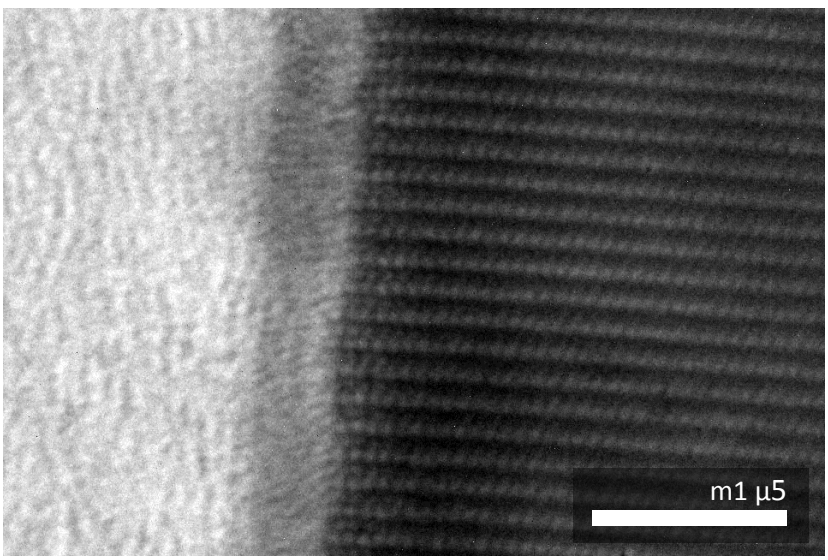

Figure S7. HRTEM image of an InAs NW with 50 nm diameter, grown using a 50 nm Au nanoparticles under the condition for bimodal growth. No sign of Au atom diffusion could be seen on the nanowire sidewalls.

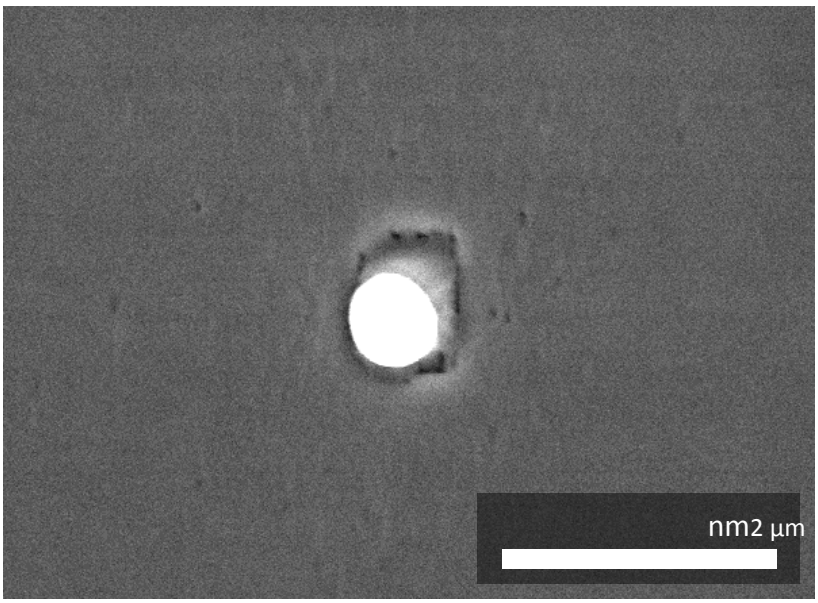

Figure S8. SEM image of a sample showing the early stages of the Au atom diffusion process. TMIn and AsH3 sources were flown for 30 seconds. Small etched pits can be observed within several micron distances from the 250 nm Au nanoparticle.

