

## Supporting Information

**Lattice-Mismatched Epitaxy of InAs on (111)A-Oriented Substrate: Metamorphic Layer Growth and Self-Assembly of Quantum Dots**

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**1. InAs growth on InP (001) and (111)A substrates**

We grew 7.5 ML InAs on  $\text{In}_{0.52}\text{Al}_{0.48}\text{As}/\text{InP}(001)$  and  $\text{In}_{0.52}\text{Al}_{0.48}\text{As}/\text{InP}(111)\text{A}$  surfaces at 450 °C. The growth rate of InAs was set at 0.25 ML/s. As shown in Figure S1 (a), three-dimensional islands are formed on the (001) surface in SK mode. In contrast, two-dimensional growth continues and a flat surface is formed on (111)A.

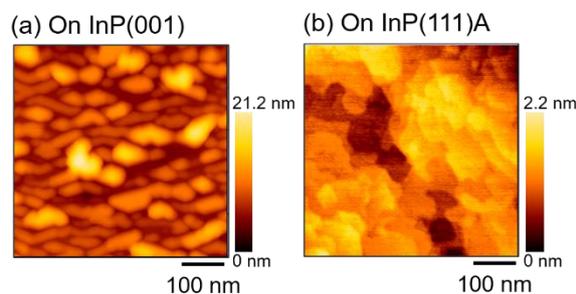


Figure S1. AFM images of 7.5 ML InAs on (a)  $\text{In}_{0.52}\text{Al}_{0.48}\text{As}/\text{InP}(001)$  and (b)  $\text{In}_{0.52}\text{Al}_{0.48}\text{As}/\text{InP}(111)\text{A}$

**2. InAs growth on GaAs (111)A**

We fabricated capped InAs QDs on GaAs (111)A. After the growth of a GaAs buffer layer, InAs QDs were formed by droplet epitaxy. 3ML-In was supplied at 300 °C for In droplet formation followed by crystallization by a supply of  $\text{As}_4$  flux ( $1.4 \times 10^{-5}$  Torr beam equivalent pressure) at 300 °C. After annealing the uncapped QDs at 400 °C, a GaAs capping layer was grown. For the AFM observation, InAs QDs was formed on the capping layer again by the

same process. Figure S2 (a) shows the AFM image of the InAs QDs. Well-defined InAs QDs are formed. In contrast, no clear PL emission from the InAs QDs was observed, as seen in Figure S2 (b). The absence of PL emission from the InAs QDs evidences the misfit dislocation formation. These experiments were performed in collaboration with Dr. M. Jo.

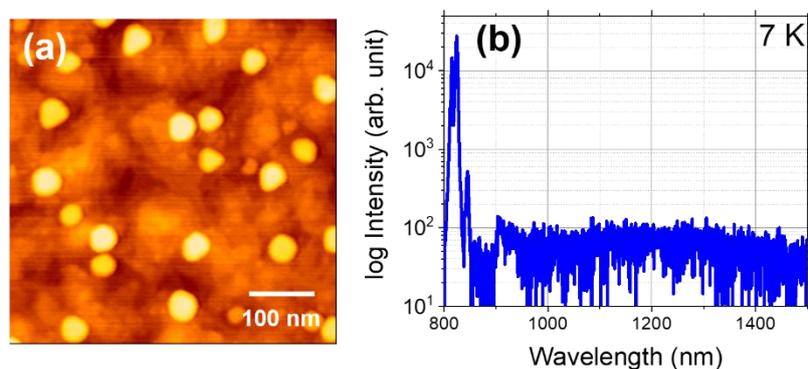


Figure S2. (a) AFM images of 3.0 ML InAs QDs on GaAs (111). (b) PL spectrum of capped InAs QDs at 7 K.