Sample number	Growth rate of Al (Å/s)	Initial – final Substrate temperature during Al growth (°C)	comments
S1	3	14 – 33.5	It was heated after Al growth to 160 °C
S2	0.1	8 – 103.3	-
S3	3	11.3 – 38.6	-

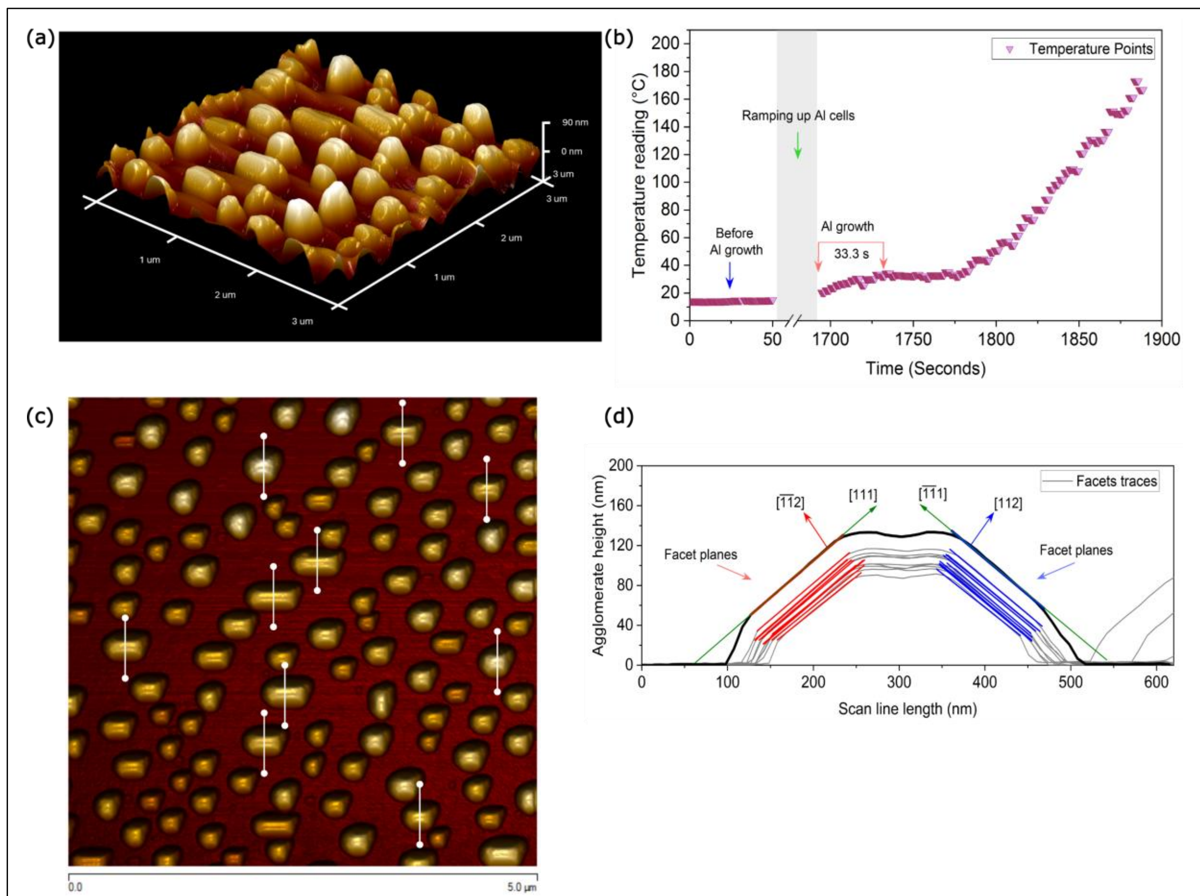

Figure 1. Atomic force microscopy (AFM) characterization of S1 following the deposition of a 10 nm Al film and subsequent heating of the substrate. (a) A 3D AFM image (3 µm × 3 µm) viewed from the side, illustrating the Al island facets. (b) The temperature profile during the process, showing an initial substrate temperature of 14 °C prior to Al growth, an increase to ~40 °C during Al deposition, and a final ramp to 160 °C. (c) A top-view AFM scan with white outlines marking the Al islands selected for line-scan analysis. (d) Line-scan results depicting the island trace (black) and the measured facet slopes (blue and red), demonstrating how elevated substrate temperature influences the morphological evolution of the Al film.

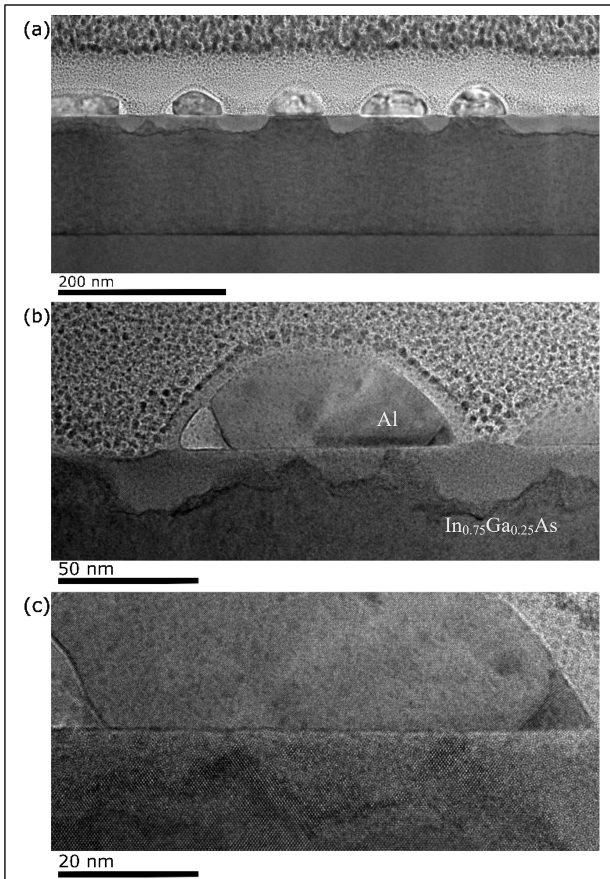

Figure 2. Cross-sectional TEM image of sample S3, showing aluminum islands formed on the InGaAs surface.

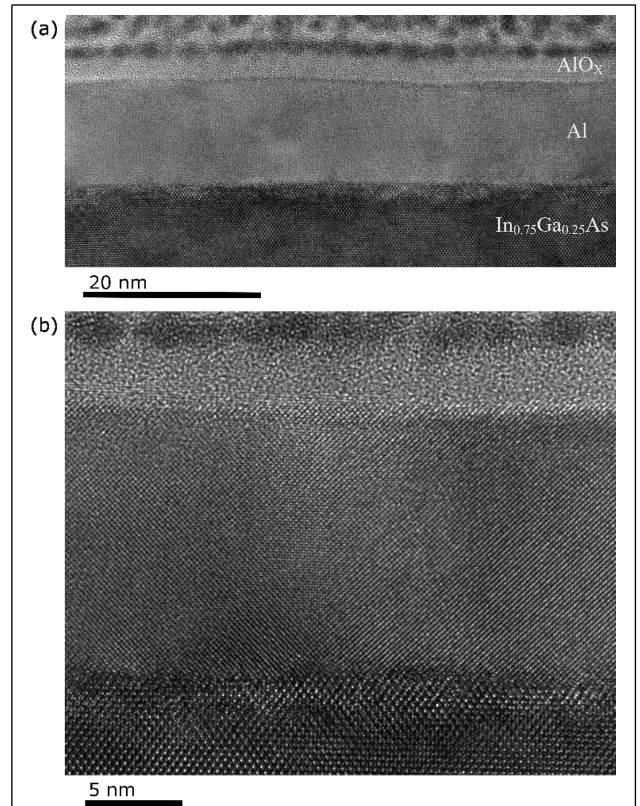

Figure 3. Cross-sectional TEM image of sample S2, revealing a clean, continuous interface between Al and InGaAs.

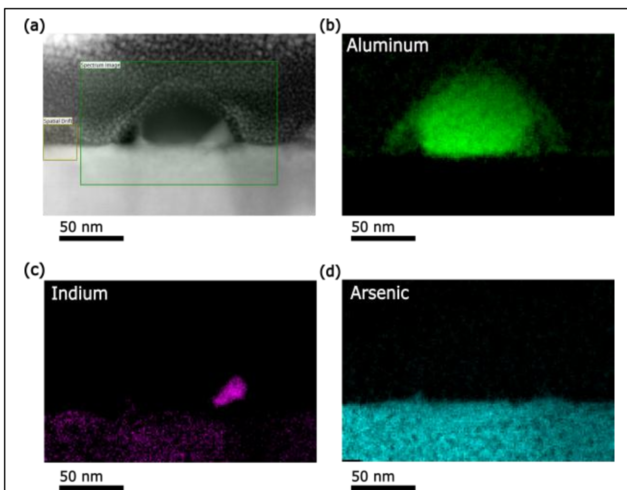

Figure 4. EDS maps of sample S2 indicating indium diffusion into the aluminum (notably in panel c), where In is detected within the Al islands.

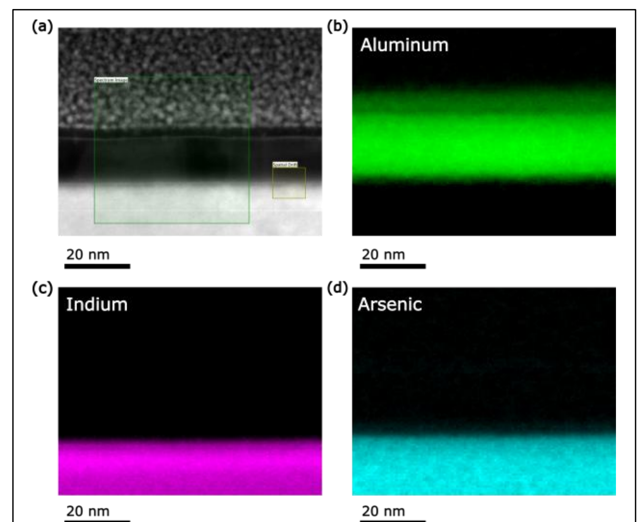

Figure 5. EDS maps of sample S3 demonstrating a distinct Al layer with no observable In diffusion, highlighted in panels (b) and (c).