Electronic Supplementary Material

InP/GaInP nanowire tunnel diodes

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S1. Band diagram of the InP/GaInP heterojunction

Figure S1  Numerical calculations of the band diagram of the InP/GaInP heterojunction by using Lastip.

S2. I-V measurements of the non-working configurations

Figure S2  I-V sweep of the two non-working tunnel diode configurations: (a) the InP:S/GaInP:Zn configuration; (b) the GaInP:Zn/InP:Sn configuration.

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S3. TEM image and EDX scans of the GaInP:Zn/InP:S junction

**Figure S3**  (a) HRTEM image of the sample with the GaInP:Zn/InP:S heterojunction viewed in the [1-10] direction, scale bar is 5 nm. The p-GaInP segment (above the black arrow) is predominantly ZB structure with twin planes, and the n-InP segment (below the black arrow) is predominately WZ structure; (b) HAADF-STEM image of the GaInP:Zn/InP:S heterojunction, scale bar 50 nm; EDX line scans of In, Ga and P.