Supporting Information

One-dimensional n-p heterojunctions of zinc oxide on gallium nitride:

A structural characterization

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Fig.S1. Selected area electron diffraction data (SAED) of cross-section of a ZnO nanowire along its width and viewed from [\textbf{1\textbf{1}\textbf{0}\textbf{0}}] zone axis. The indexed points identify two crystallographic axes of the ZnO perpendicular to its growth direction.
Fig. S2. Reflection of horizontally traveling ZnO nanowires upon contacting an already grown nanowire results in formation of geometries similar to the reflection of a ray of light from a reflective surface. This type of geometry is more seen in the areas where Au patterns are randomly placed and possibility of the nanowire crossing is more.
Fig. S3. Top view of arrays of ZnO nanowalls made from parallel Au lines with a 20 µm spacing. Nanowalls are packed side-by-side with a high density. The closest spacing observed is about 80 nm to 100 nm.
Figure S4.  a) Representative HRTEM image of a section of GaN about 20 nm underneath the ZnO nanocrystal; this is the area that stress in GaN is less. The plane of view is \( \{01\bar{1}0\} \). b) Representative HRTEM image of a section of ZnO nanowall; the plane of view is \( \{01\bar{1}0\} \).
Figure S5. HRTEM image of a ZnO nanowall interface with GaN; the arrow shows the interface. Moving up from bottom of the interface, the GaN lattice deformation and lattice strain demonstrates itself. The white lines show part of GaN lattice that has no significant strain; however, few unit cells above, the yellow line shows the start of the crystal deformation. The first yellow line is the beginning of this region; the strain continues to the interface (the 2\textsuperscript{nd} yellow line).