

I. Concepts, Electron microscopy images, and the self-powered PEC-PDs performance

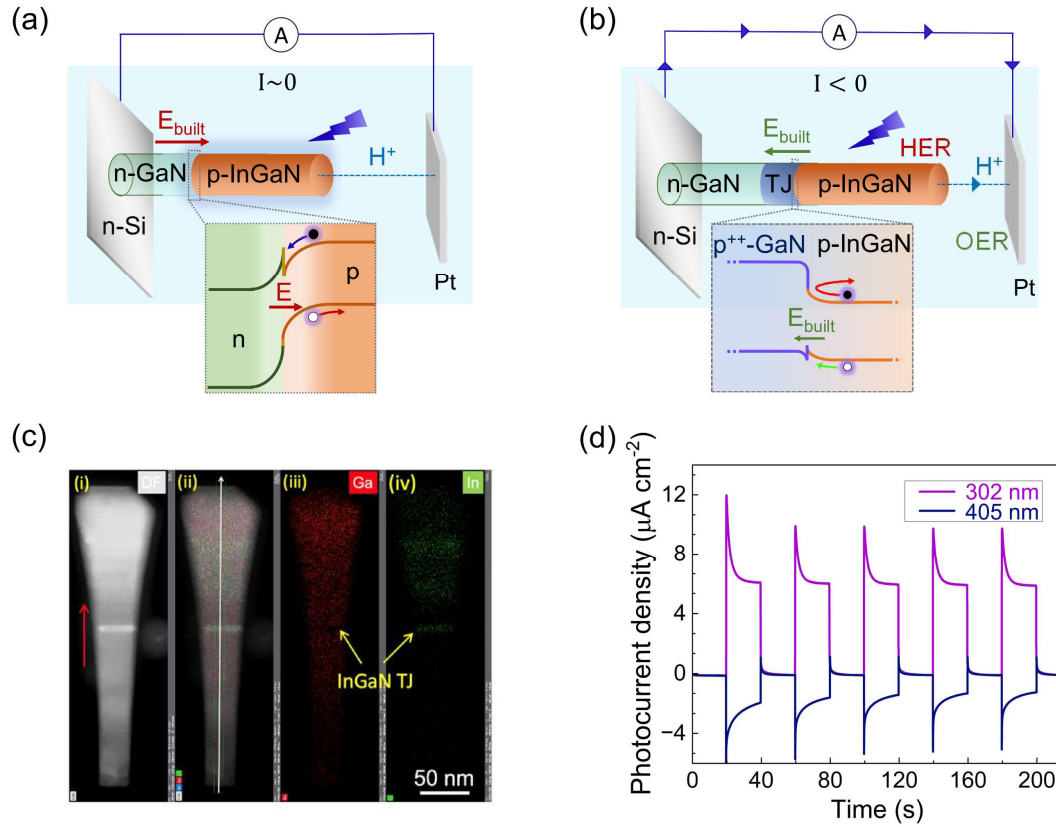


Figure S1. Schematic of the fabricated device with the present nanowires: (a) without tunnel junction. (b) with p^+ -GaN/InGaN/ n^+ -GaN TJ. (c) TEM and dark field STEM images show the successful TJ embedded in the structure. (d) photoresponse of the PEC-PD under 302 nm and 405 nm with power density of 1.6 $mW cm^{-2}$ and 4.5 $mW cm^{-2}$, respectively.