SUPPLEMENTARY INFORMATION

Photovoltaic nanowires affect human lung cell proliferation under illumination conditions.

Therese Olsson[1], Laura Abariute[1], Lukas Hrachowina[1], Enrique Barrigon[1], Diogo Volpati[1], Steven Limpert[1], Gaute Otnes[1,+], Magnus T. Borgström[1], and Christelle N. Prinz[1,*]

[1] Division of Solid State Physics and NanoLund, Lund University, 221 00 Lund, Sweden
[+] current affiliation: Institute for Energy Technology, NO-2007 Kjeller, Norway
[*] corresponding author: Christelle N. Prinz (christelle.prinz@ftf.lth.se)

Figures

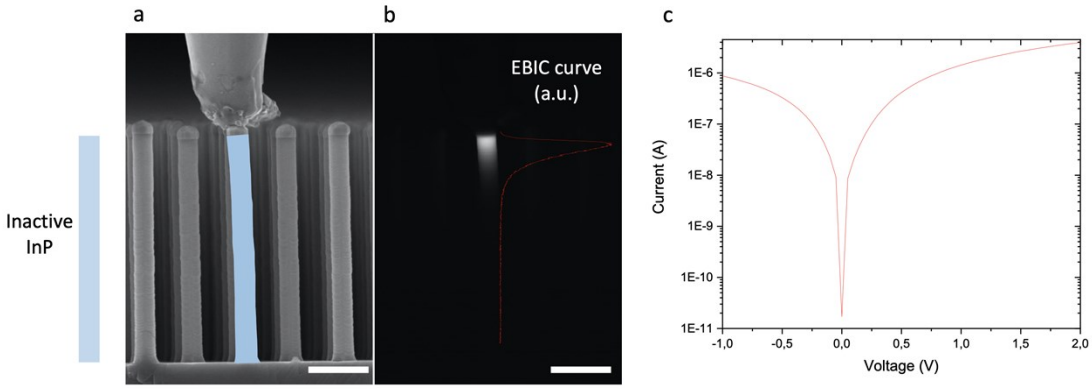

Fig S1: Properties of the InP inactive nanowires. (a) Schematic of an inactive InP (InP i) nanowire next to false colored SEM image of a cross section of the InP i nanowire array. (b) EBIC profile of the InP i nanowire contacted by the nanoprobe. The measured signal on top of the nanowire is due to the Schottky contact between the Au particle and the inactive NW. (c) I-V curve of the InP i nanowire contacted by the nanoprobe. Scale bars: 500 nm

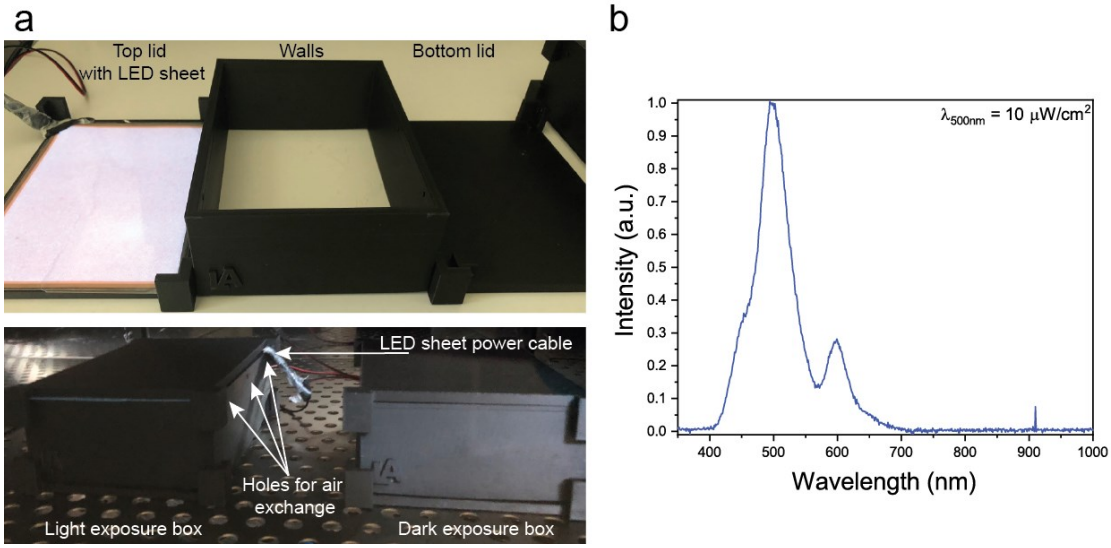

Fig. S2: (a) experimental setup, with the 3D printed box components and the electroluminescent panel. (b) light spectrum of the electroluminescent panel. The spectrum was collected using a Red Tide USB650 spectrometer (Ocean Optics) and the intensity was normalized to the intensity of the peak at 500 nm. The electroluminescent panel power at 500 nm wavelength was 10 μW/cm^2, as measured using a photodiode power sensor S120VS (ThorLabs).

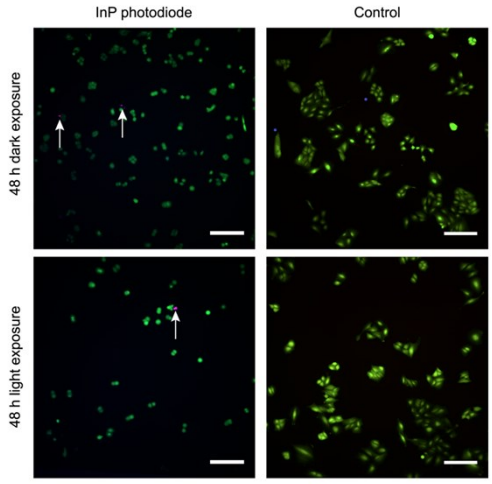

Fig. S3: Representative fluorescence microscopy images after performing live/dead assay on A549 cells cultured on InP p-i-n nanowire arrays, and glass cover slip (controls) in the presence and absence of light. Healthy cells fluoresce in green, damaged cells fluoresce in red (indicated by white arrows). Scale bar: 200 μm.

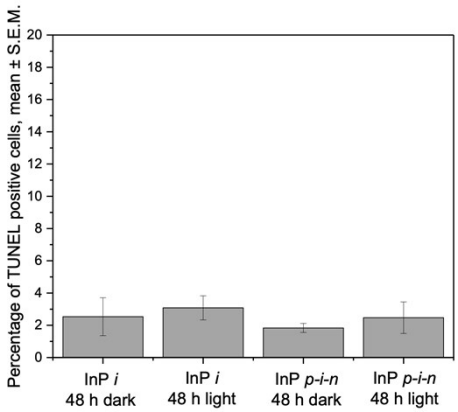

Fig S4: Percentage of apoptotic cells (TUNEL positive) cells on inactive InP nanowire (InP i) substrates and InP p-i-n nanowire substrates, with and without illumination (± S.E.M.). n=4, with over 500 cells counted for each condition. According to one-way ANOVA statistical analysis, there are no statistical significant difference between substrates and light exposure at $p<0.05$.

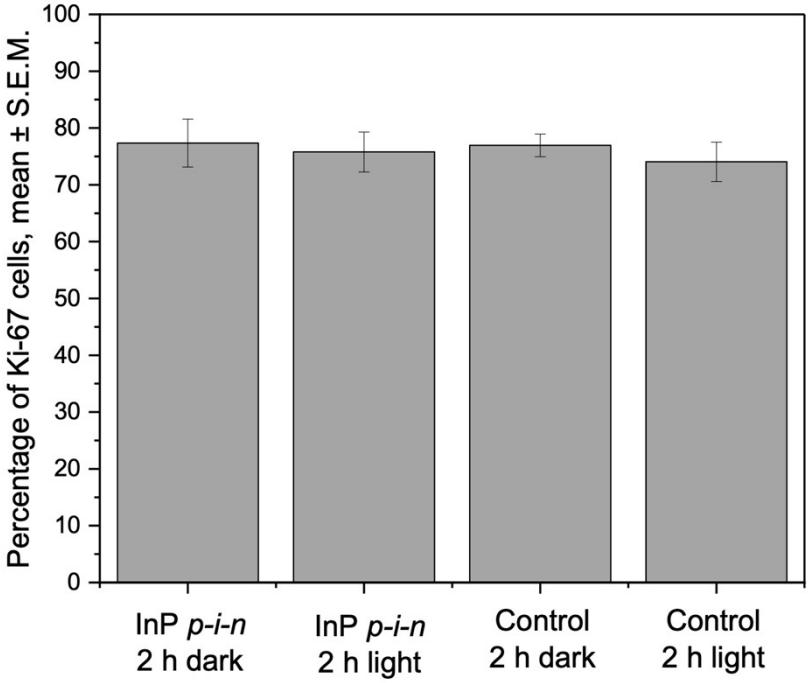

Fig S5: Percentage of Ki-67 positive cells on InP p-i-n nanowire arrays and glass substrates (Control) after 2 hours culture in the presence and absence of light (± S.E.M.). n=3, with a minimum of 120 cells counted for each conditions. According to one-way ANOVA statistical analysis, there are no statistical significant difference between substrates and light exposure at $p<0.05$.

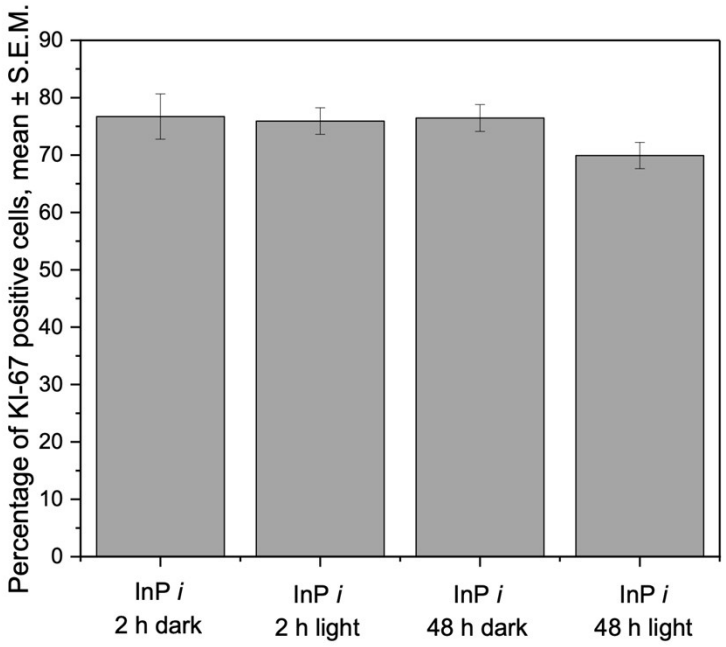

Fig S6: Percentage of Ki-67 positive cells on inactive (InP i) nanowire arrays after 2 and 48 hours of culture in the presence and absence of light (± S.E.M.). n=3. According to one-way ANOVA statistical analysis, there are no significant statistical difference between substrates and light exposure at $p<0.05$.

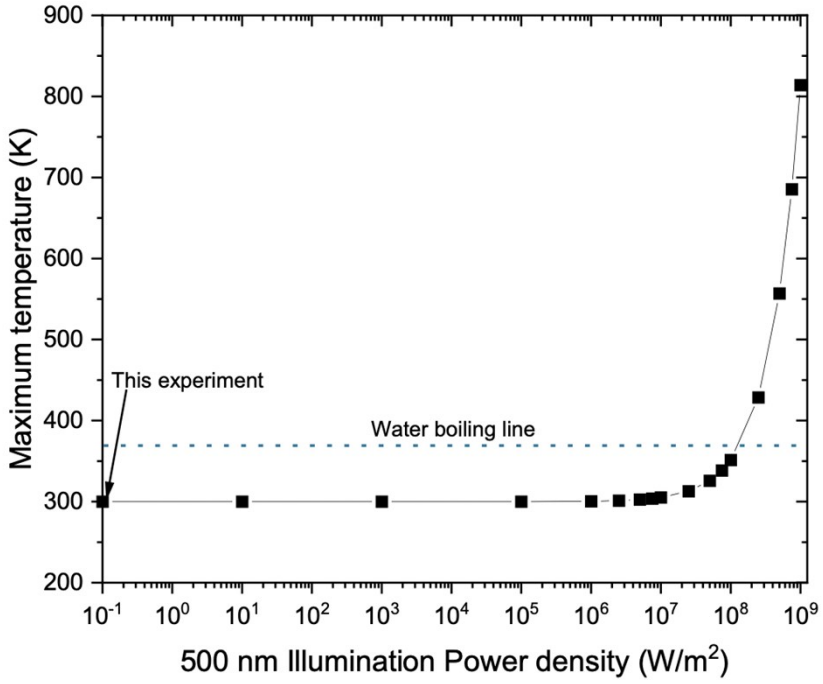

Fig. S7: Sequentially executed FDTD electromagnetic wave simulations and FEM heat transport simulations showing that the absorption of the experimental illumination spectrum by the Au seed particles of the nanowire arrays does not result in any substantial heating of the seed particles, nanowire arrays, substrates or surrounding water. Specifically, at the experimental 500 nm illumination power density of 0.1 W/m^2, the maximum temperature increase array was found to be 52×10^{-9} K.

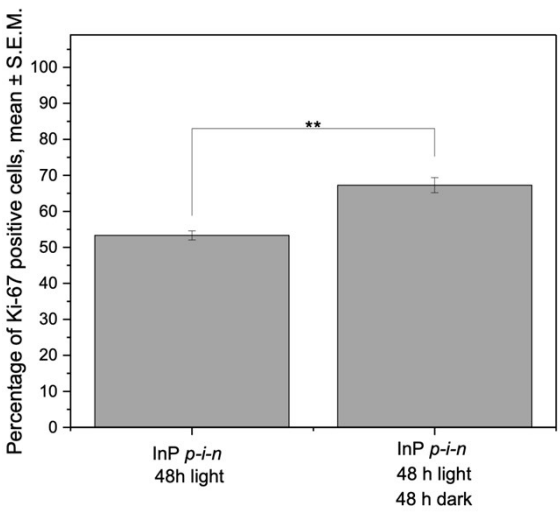

*Fig. S8: Partial recovery in the proportion of Ki-67 cells. Proportion of Ki-67 positive cells cultured on InP p-i-n nanowire substrates for 48 h under light exposure (48h light) and after 48 additional hours in the dark (± S.E.M.). n=3 with more than 700 cells counted for each treatment. **:p<0.01, one-way ANOVA.*

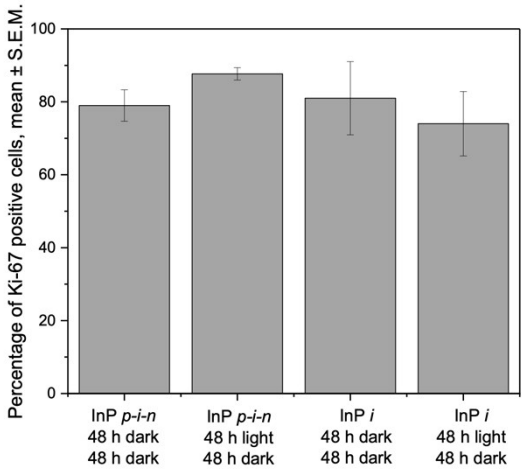

Fig. S9: Illuminating the substrate before cell culturing has no effect on the cell proliferation. Proportion of Ki-67 positive cells cultured on InP p-i-n nanowire substrates (InP p-i-n) and InP inactive nanowire substrates (InP i) in the dark for 48h after pre-exposure of the substrate with medium to light/dark for 48 h (± S.E.M.). n=3 with a minimum of 340 cells counted for each experiment. According to one-way ANOVA statistical analysis, there are no significant statistical difference between substrates and light exposure at p<0.05.

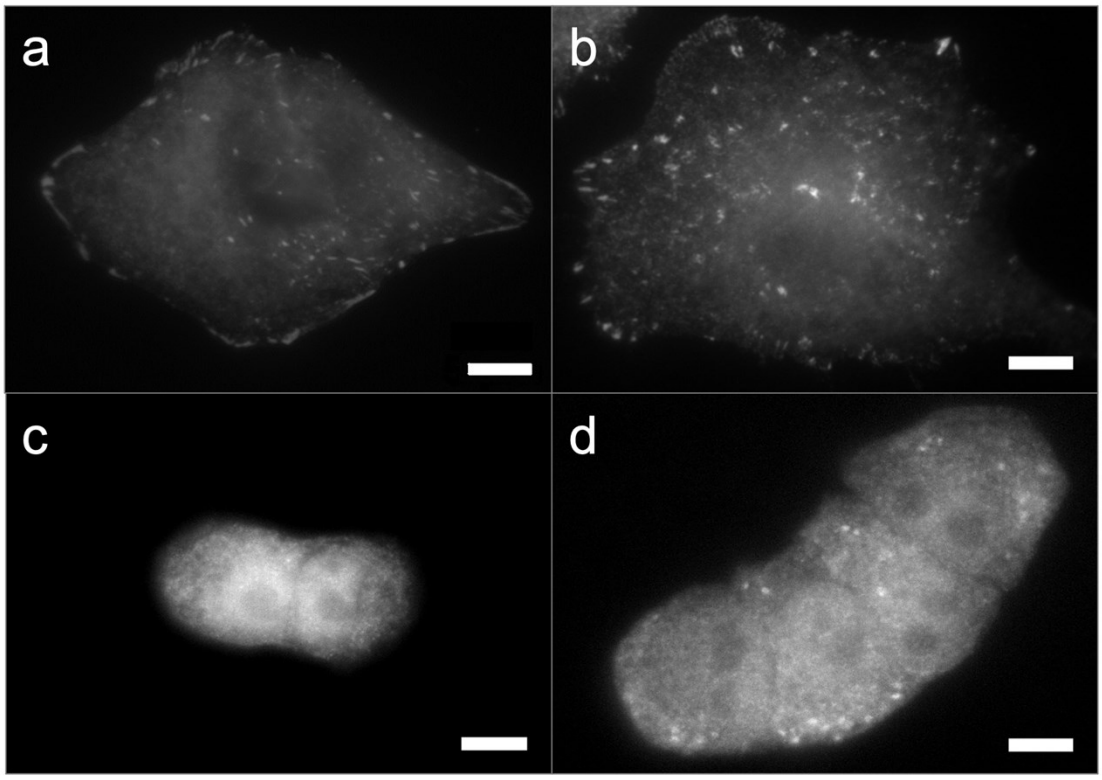

Fig. S10: Fluorescence microscopy images of vinculin in A549 cells cultured for 48 h on glass in the dark (a), on glass under illumination (b), on InP p-i-n nanowire substrates in the dark (c) and on InP p-i-n nanowire substrates under illumination (d). Scale bars: 5 µm.