Perovskite nanowire lasers on low-refractive-index conductive substrate for high-Q and low-threshold operation

Daria I. Markina,[1] Anatoly P. Pushkarev,[1] Ivan I. Shishkin,[1] Filipp E. Komissarenko,[1] Alexander S. Berestennikov,[1] Alexey S. Pavluchenko,[2] Irina P. Smirnova,[2] Lev K. Markov,[2] Mikas Vengris,[3] Anvar.A. Zakhidov,[1,4] and Sergey.V. Makarov[1]

[1] *Department of Physics and Engineering, ITMO University, St. Petersburg 197101, Russia*
[2] *Ioffe Institute, 194021 St. Petersburg, Russia*
[3] *Laser Research Center, Faculty of Physics, Vilnius University, LT-10223 Vilnius, Lithuania*
[4] *University of Texas at Dallas, Richardson, TX 75080, USA*

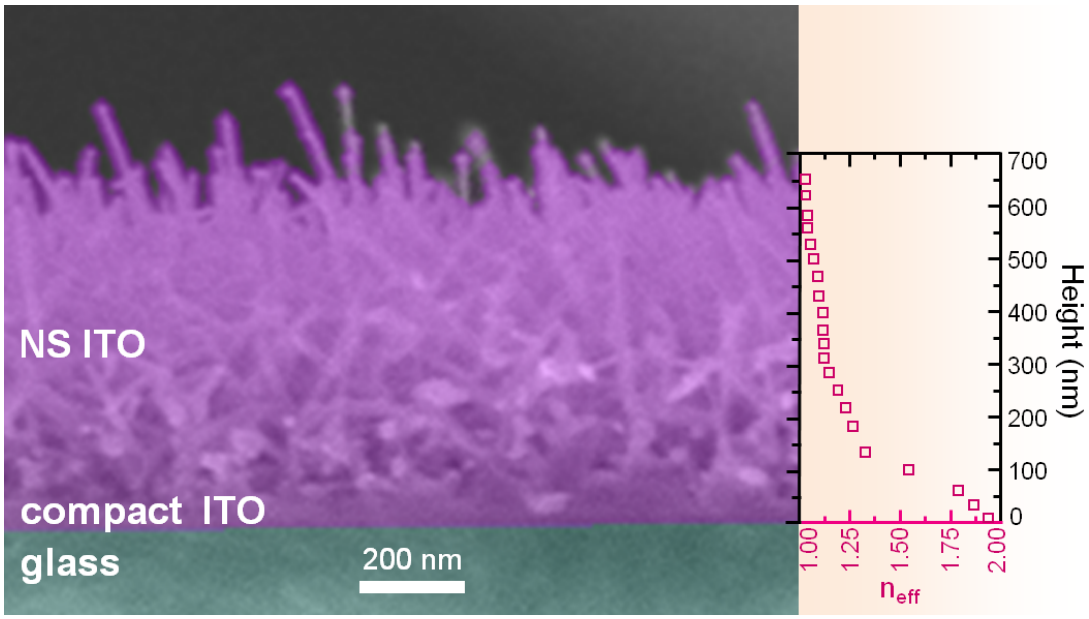

Figure S 1. Cross-sectional SEM image of the nanostructured ITO substrate and $n_{eff}(h)$ profile for the ITO layer.

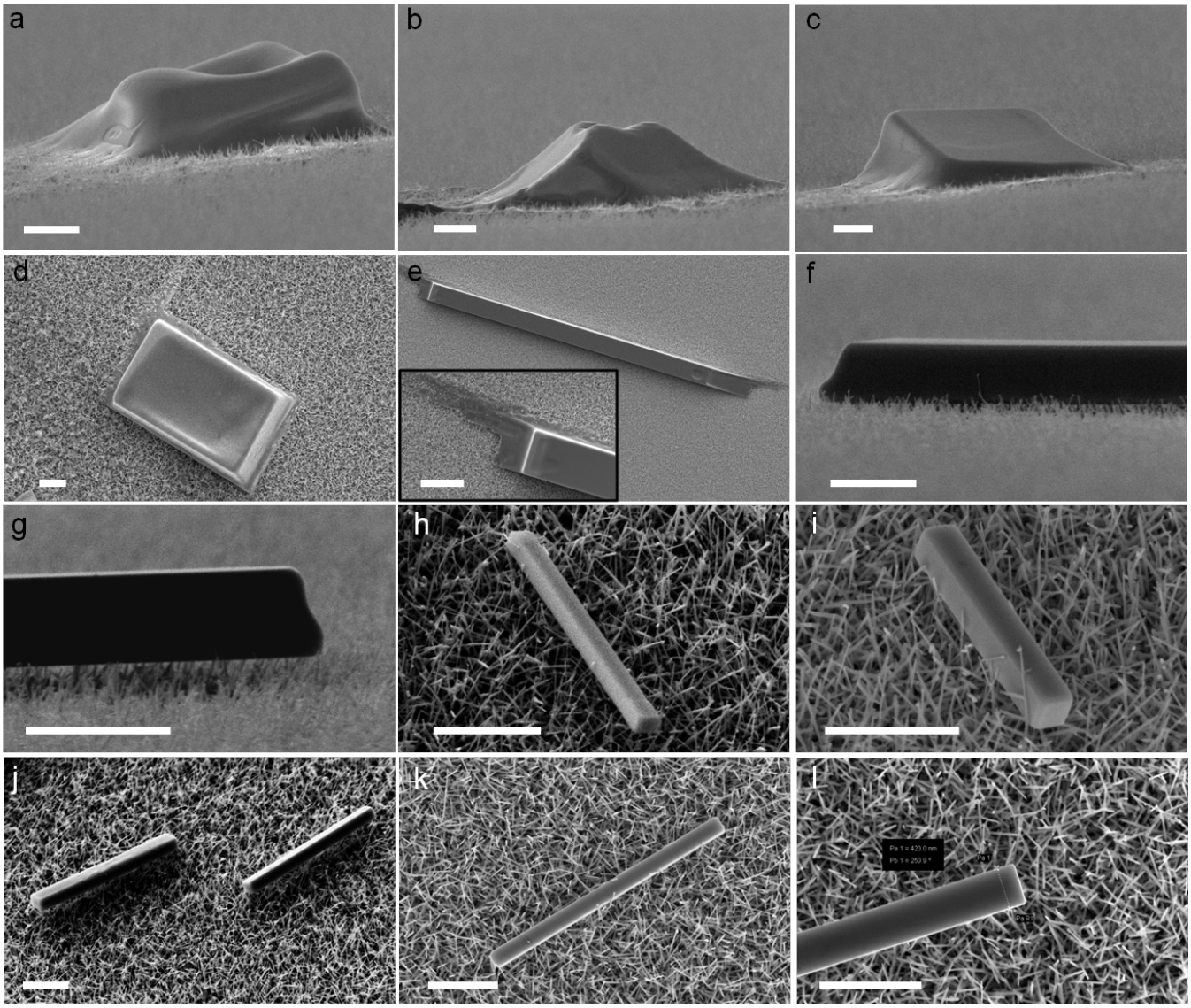

Figure S 2. SEM images of typical $CsPbBr_3$ nano- and microstructures on NS ITO substrates covered with 0 wt.% (a-c), 1 wt.% (d,e), 3 wt.% (f,g), and 5 wt.% (h-l) oleic acid–toluene solution before the deposition of the perovskite ink (scale bars are 1 μm).

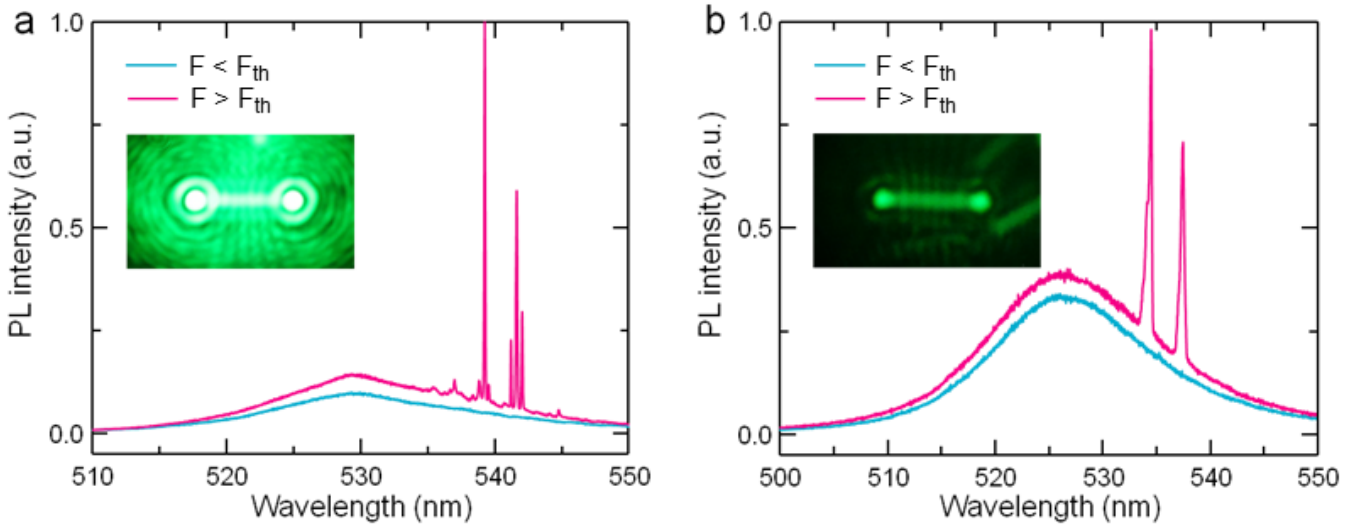

Figure S 3. PL spectra of NWs **1** (a) and **2** (b) excited at fluence below and above the lasing threshold. In both nanowires the multimode laser generation is observed. Inset images show interference patterns observed owing to emission of two point-like coherent light sources - end facets.

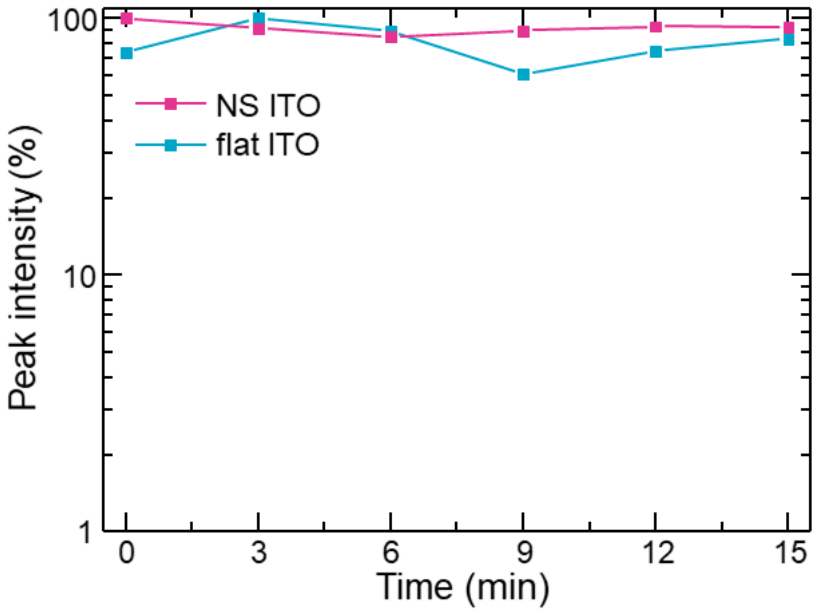

Figure S 4. Temporal behavior of the intensity of the dominant laser peak in the spectra of similar NWs deposited on NS and flat ITO substrates.