Supplementary Information

Surface plasmon enhanced photoluminescence from porous silicon nanowires decorated with gold nanoparticles

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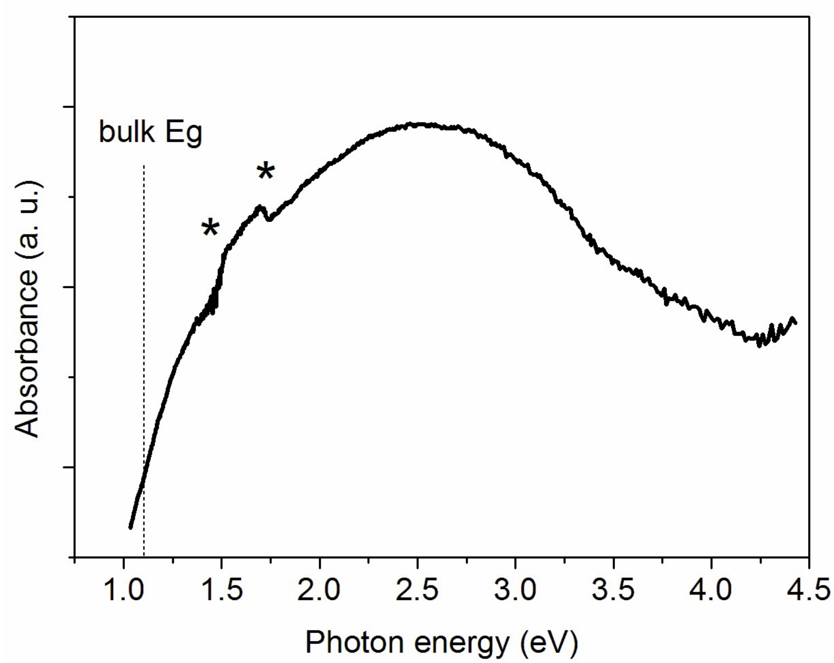

Figure S1. Optical absorption spectrum of porous Si nanowires. The nanowires were scratched from the wafer and distributed in ethanol for measurement. The sudden changes labelled by * symbol is due to equipment artifact. We find the absorption can be divided into two regions regarding the slope. The first one in the range of 1.1-1.35 eV is abrupt (but still milder than that of bulk Si), while the increase of the second one (~1.35-2.5 eV) is much milder. We suggest the two regions result from the large (bulk-like) and small Si nanocrystals, respectively. The mild and broad absorption is a result of the size (hence the bandgap) distribution of Si nanocrystals.

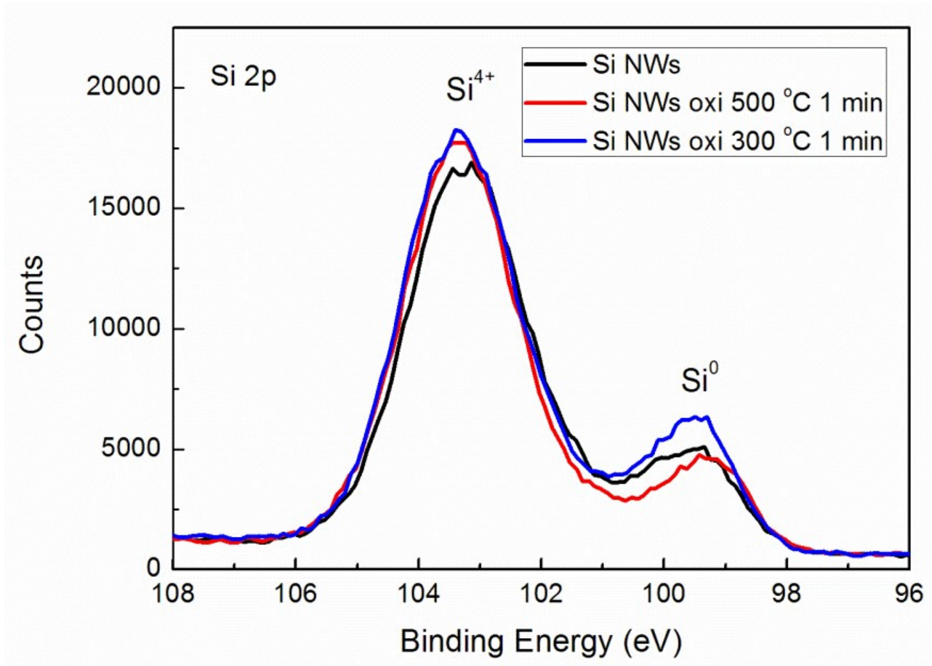

Figure S2. XPS Si2p core level spectra of the porous Si nanowires before and after oxidation at 300 and 500°C. The peak at 103.1 and 99.4 eV is attributed to Si^{4+} in SiO_2 and Si^0, respectively. Because XPS collect signals from the very surface of less than 3-5 nm, and the nanowire surface is very rough, the three curves show not much different. In this regard, the thickness of SiO_x layer is hard to be determined. We also note that for such nanowire assembly with rough surface, XPS depth profile is not reliable.

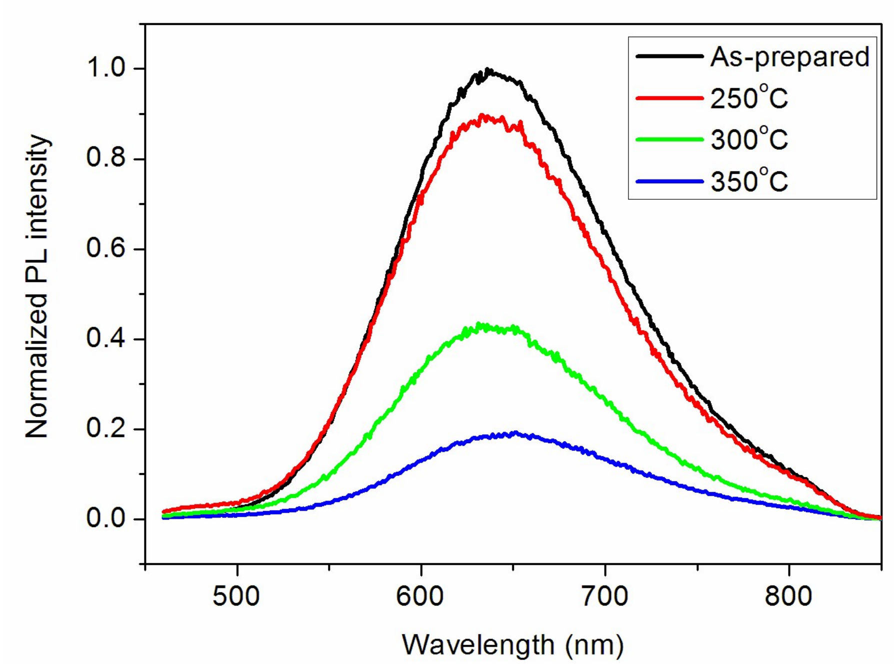

Figure S3. PL spectra of the as-prepared and thermally treated porous Si nanowires. The thermal treatment in oxygen, hence the formation of SiO_2 layer, results in decrease of PL with increasing temperature.