

Supplementary Materials:

S1. Structural results

S1.1. TiO₂ shell layer prepared by pulsed laser deposition (PLD)

In sample of ZnO nanorods with deposited TiO₂ layer using 7500 pulses of laser (5Hz) in vacuum formed smooth layer of TiO₂ at the surface (Figure S1 a), while in Ar atmosphere (30 Pa), TiO₂ formed larger nanoparticles and clusters on the surface of ZnO NR (Figure S1 b). After heating at 400 °C, the morphology of the TiO₂ layer was not changed (Figure S1 c). The number of laser pulses influenced the shape of upper part of nanorods, so by using the lower number of pulses (5000) the top of the nanorods show minor extending (Figure S1 d).

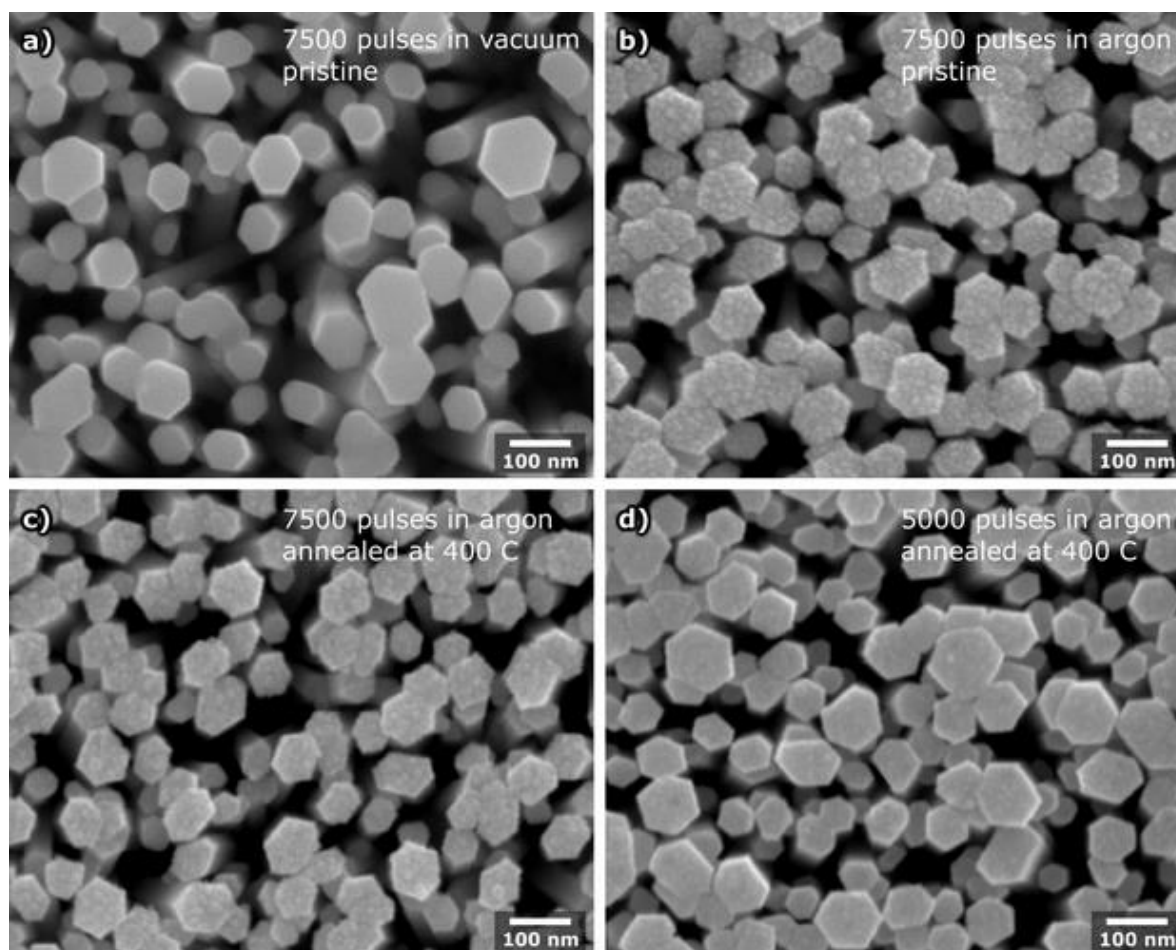
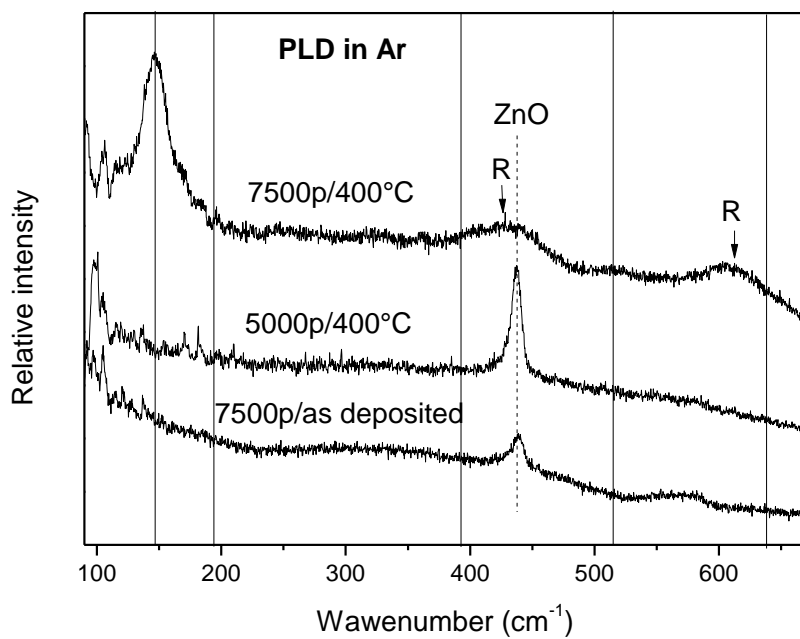


Figure S1: Scanning electron microscopy images of ZnO NR (surface view) with layer of TiO₂ deposited by PLD: a) using 7500 pulses of laser (5Hz) in vacuum, pristine as deposited, b) using 7500 pulses (5Hz) in Ar, pristine as deposited c) using 7500 pulses in Ar after heating in air at 400 °C, d) using 5000 pulses (5Hz) in Ar after heating in air at 400 °C surface view.

b)



a)

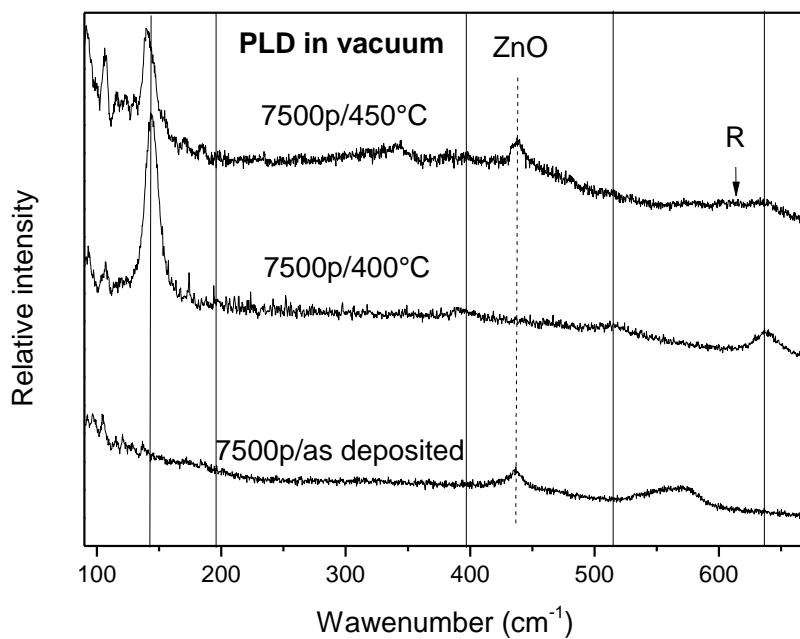


Figure S2: Raman spectra of TiO₂ deposited by PLD: a) in vacuum and b) in 30 Pa argon. Full lines denoted the positions of anatase Raman bands, while the number of laser pulses and annealing temperature are denoted above spectra.

S1.2. TiO₂ shell layer prepared by magnetron sputtering

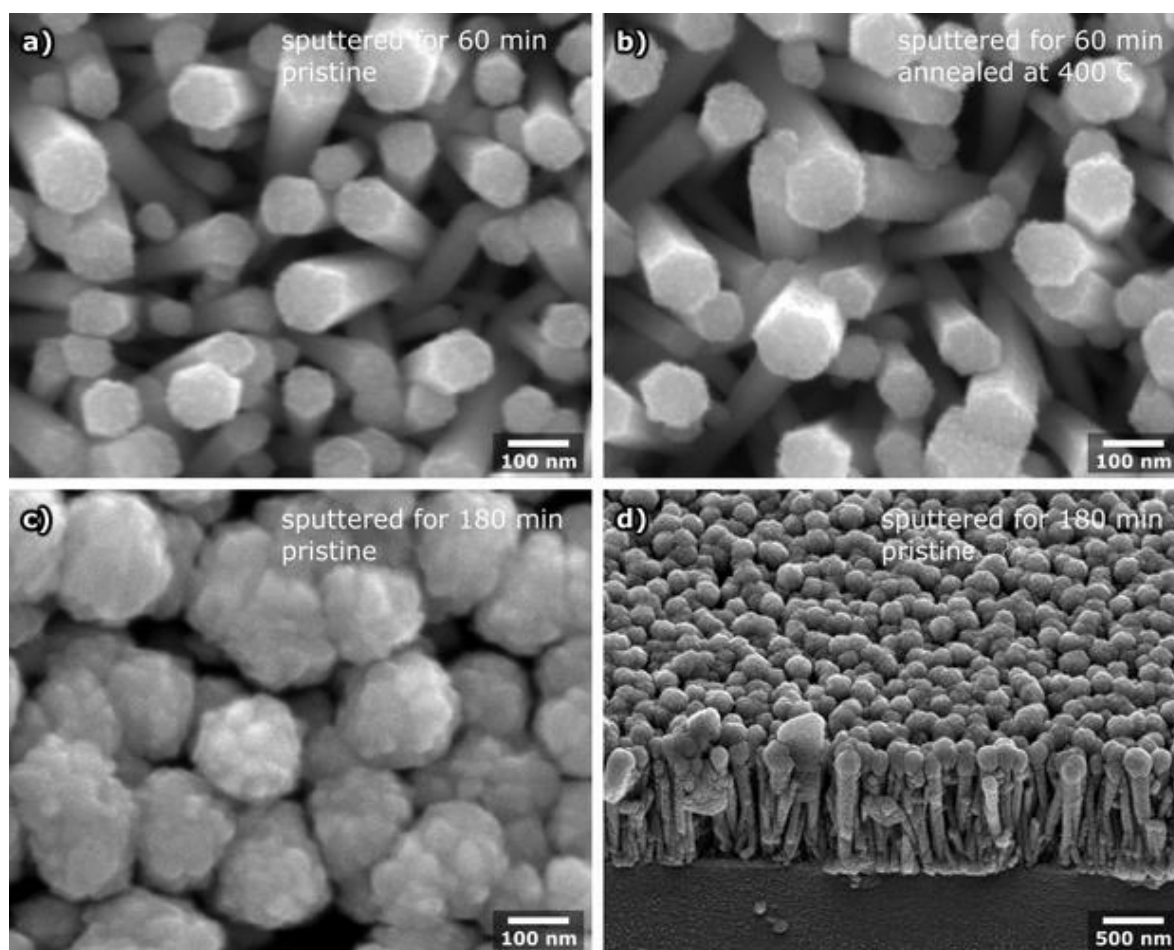


Figure S3: ZnO@TiO₂ core-shell nanorods with TiO₂ layer prepared by DC reactive magnetron sputtering: a) 1 h deposition, pristine, b) 1 h deposition, after annealing at 400 °C, c) 3 h deposition, pristine, top view, and d) 3 h deposition, pristine, side view

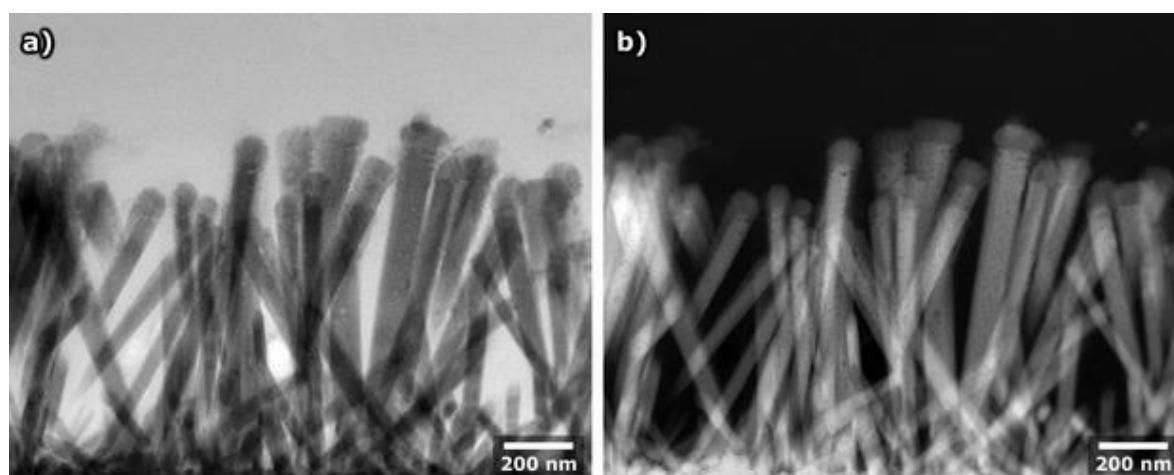


Figure S4: The cross section ZnO@TiO₂ core-shell nanorods with TiO₂ layer prepared by 1 h of DC reactive magnetron sputtering: a) bright field STEM, b) HAADF.

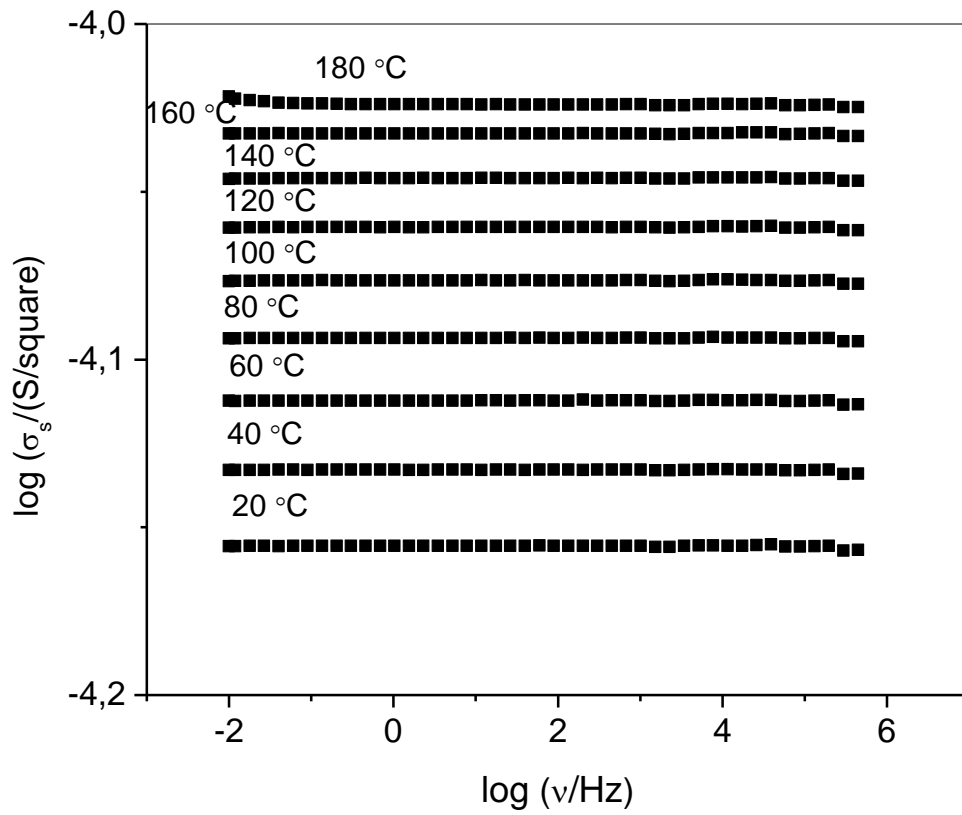


Figure S5: Conductivity spectra at different temperatures for ZNR@TiO₂ prepared by spin coating deposition of chemically prepared TiO₂.

S3. Optical properties

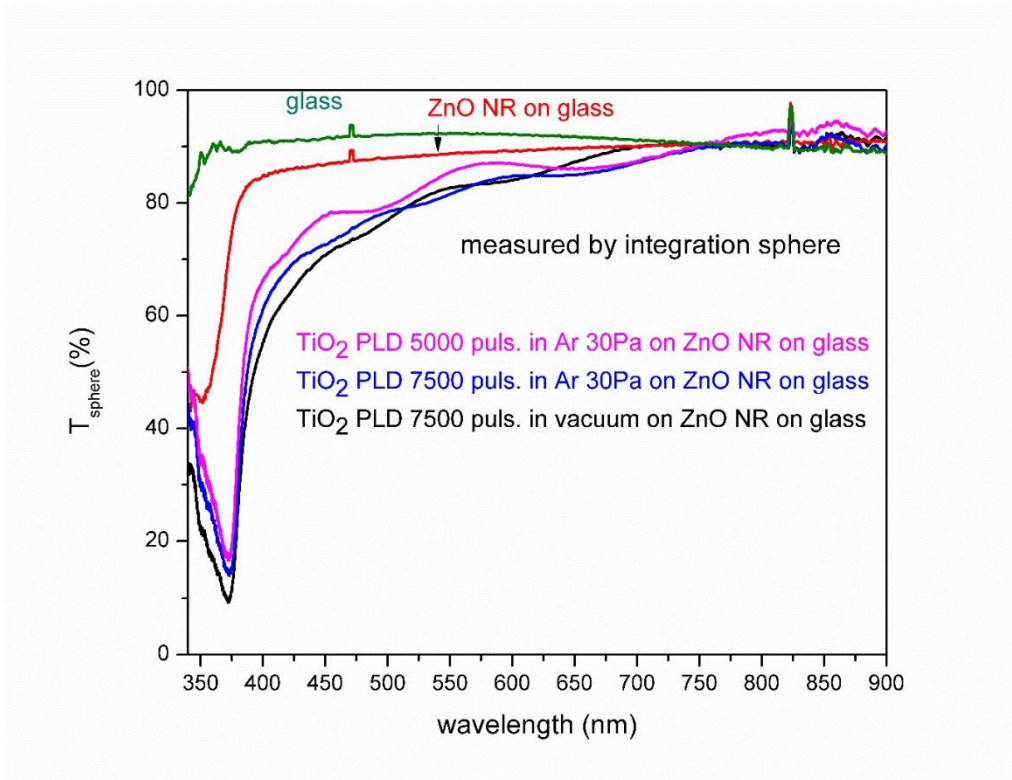


Figure S6: UV-Vis transmittance results of ZnO@TiO₂ NR array with TiO₂ deposited by PLD measured by integration sphere.

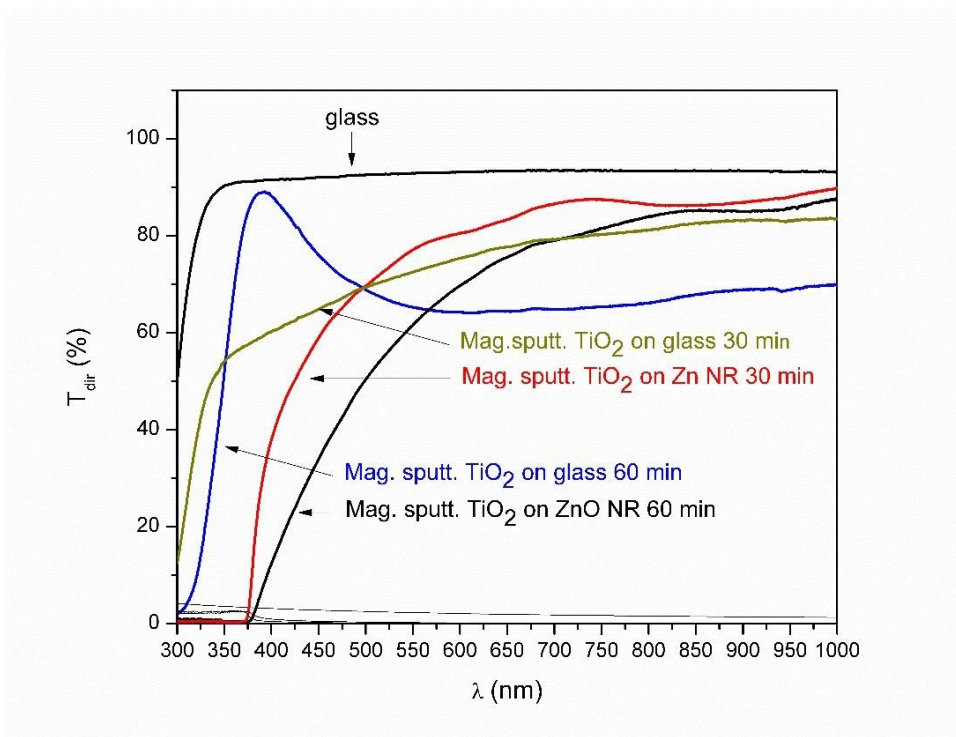


Figure S7: Transmittance of ZnO@TiO₂ NR array with TiO₂ is deposited by magnetron sputtering and thin TiO₂ films deposited on glass under same conditions.