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Supporting Information

Passivation layers for nanostructured photoanodes: ultra-thin oxides on InGaN nanowires

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S1. Bias Dependent PL and PC of Al_2O_3-Coated InGaN NWs

Al_2O_3-coated samples show almost no bias dependence in PC and PL measurements, suggesting that a change in band bending induced by the applied bias has only small influence on the amount of carrier transfer into the electrolyte. This supports the assumption that band transfer from the InGaN material into the Al_2O_3 coating is suppressed.

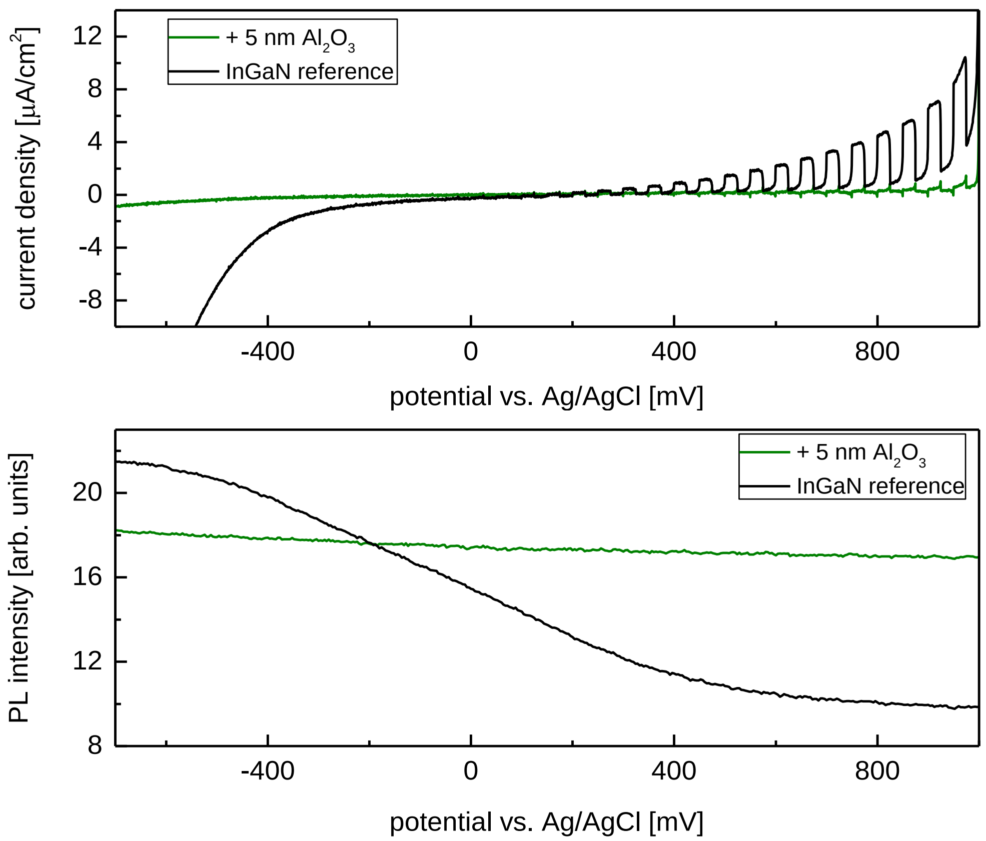

Figure S1. Bias dependent measurements of PC and PL on Al_2O_3-coated InGaN nanowires compared to the uncoated reference sample. (a) Illuminated with a 523 nm LED; (b) Illuminated with a 405 nm laser diode.

S2. Photocurrent of 10 nm Al_2O_3-coated InGaN Nanowires

For 10 nm Al_2O_3-coated samples no PC was observed. This supports the theory that the hole transfer is blocked by the valence band offset and also that the hole transport in the case of nominally 5 nm thick Al_2O_3 coatings is caused by tunnelling through thin areas of the coating that exist due to the surface roughness.

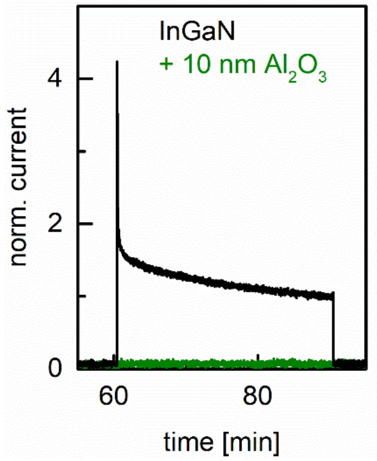

Figure S2. Photocurrent of 10 nm Al_2O_3-coated sample compared to uncoated reference sample. Measurement at 700 mV.

S3. EELS of CeO_2-Coated InGaN NWs

The EELS measurement of CeO_2-coated NWs shows a high Ce^{3+} signal, especially at the surface documenting a high degree of Ce^{3+} defects/sites and resulting oxygen vacancies in the ceria coating.

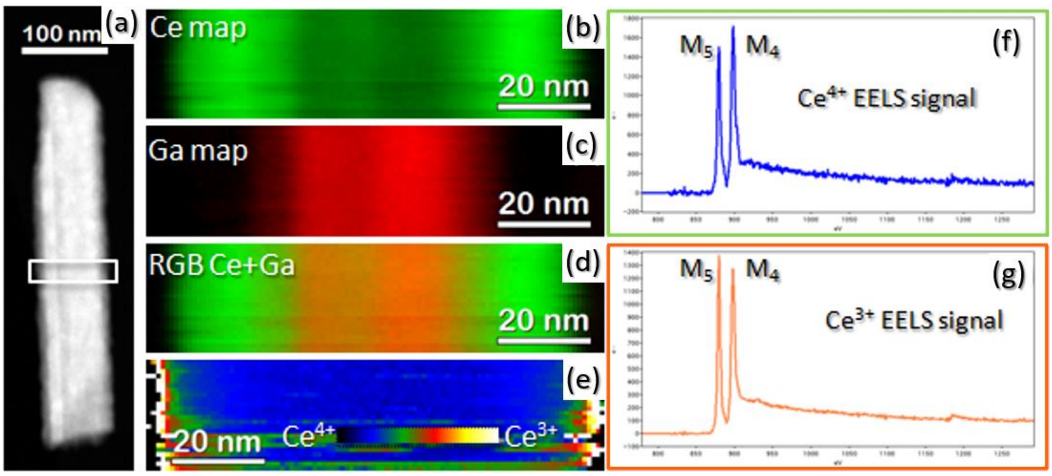

Figure S2. EELS mapping of CeO_2-coated InGaN nanowires. The area marked in (a) was investigated in (b-g). In (e) the Ce^{4+} and Ce^{3+} signals are separated. Original Ce^{4+} and Ce^{3+} spectra are displayed in (f) and (g) resp.

S4. Tauc Plots for Determination of Band Gaps

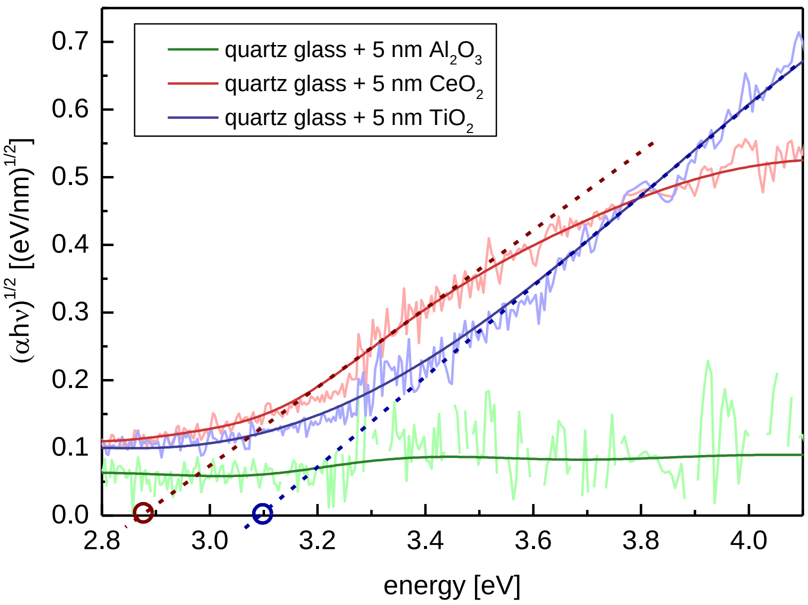

Figure S3. Tauc-Plots for the determination of the indirect band gaps of CeO_2 and TiO_2. Transmission measurements were performed on 5 nm thin oxide films prepared with ALD on quartz glass.