Supplementary Information

Oxide-Oxide Nanojunctions in coaxial SnO_2/TiO_2, SnO_2/V_2O_3 and $SnO_2/(Ti_{0.5}V_{0.5})_2O_3$ Nanowire Heterostructures

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S1. Atomic simulation of the interfaces between rutile SnO_2 NW core and different shells: (a) Ti_2O, (b) Ti_2O_3, (c) TiO2 rutile and (d) TiO_2 anatase.

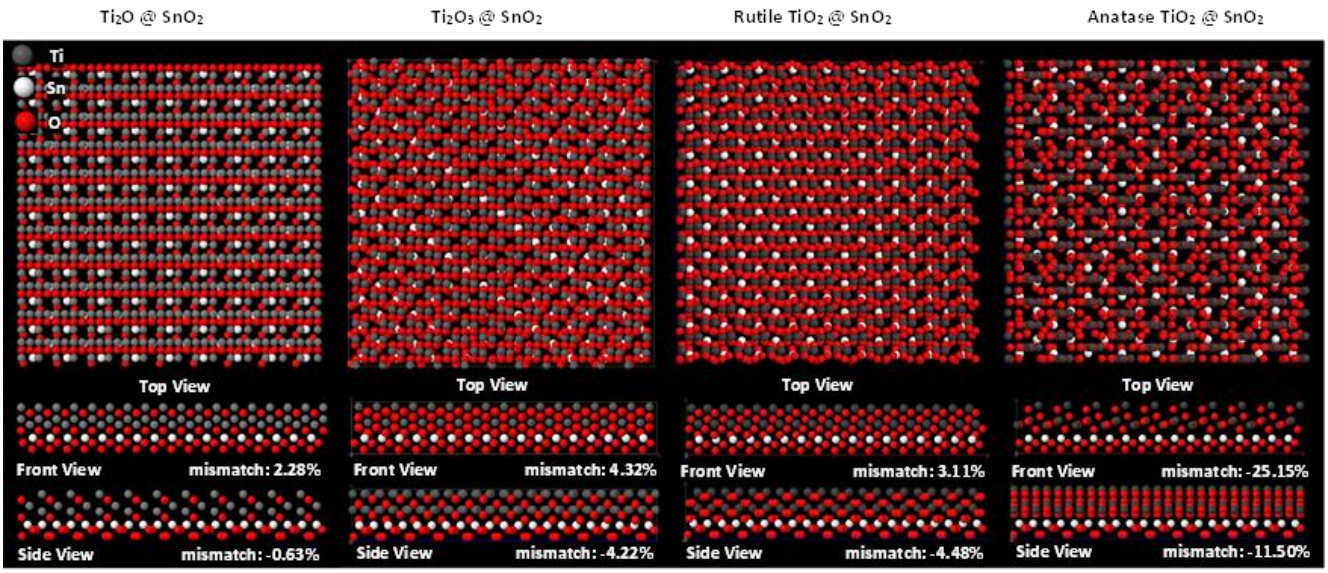

Figure S1. Atomic simulation of the interfaces between rutile SnO_2 NW core and different shells: (a) Ti_2O, (b) Ti_2O_3, (c) TiO2 rutile and (d) TiO_2 anatase. Top views show the $[10\text{-}10]_{Ti2O}$ // $[0\text{-}11]_{SnO2}$ in the case of Ti_2O on SnO_2, $[11\text{-}20]_{Ti2O3}$ // $[0\text{-}11]_{SnO2}$ zone axis in the case of Ti_2O_3 on SnO_2 and $[0\text{-}11]_{TiO2}$ // $[0\text{-}11]_{SnO2}$ in the case of TiO_2 rutile and anatase on SnO_2. Front views are visualized along the $[0001]_{Ti2O/Ti2O3}$ // $[100]_{SnO2}$ zone axis in the case of Ti_2O and Ti_2O_3 on SnO_2, and along the$[100]_{TiO2}$ // $[100]_{SnO2}$ zone axis in the case of TiO_2 rutile and anatase on SnO_2. Finally, the side view corresponds to the $[\text{-}12\text{-}10]_{Ti2O}$ // $[011]_{SnO2}$, $[\text{-}1100]_{Ti2O3}$ // $[011]_{SnO2}$ and $[011]_{TiO2\ anat/rutile}$ // $[011]_{SnO2}$ directions. In each case mismatch percentage is indicated under the model.

S2. Formation mechanism of SnO2- based heterostructures.

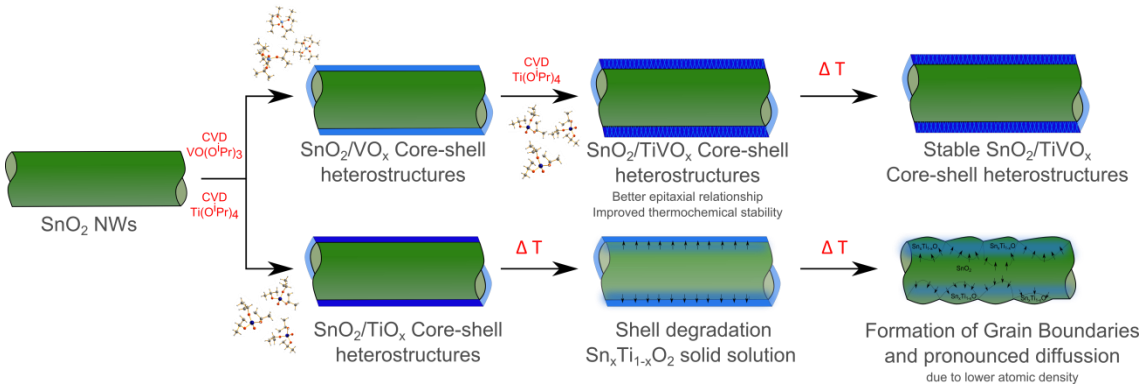

Figure S2. Formation mechanism of SnO2- based heterostructures. While titania shells degrade, vanadia overlayers show improved epitaxial relationships and thermochemical stability.

S3. In-situ mass spectrometical analysis of the gas phase during the deposition process.

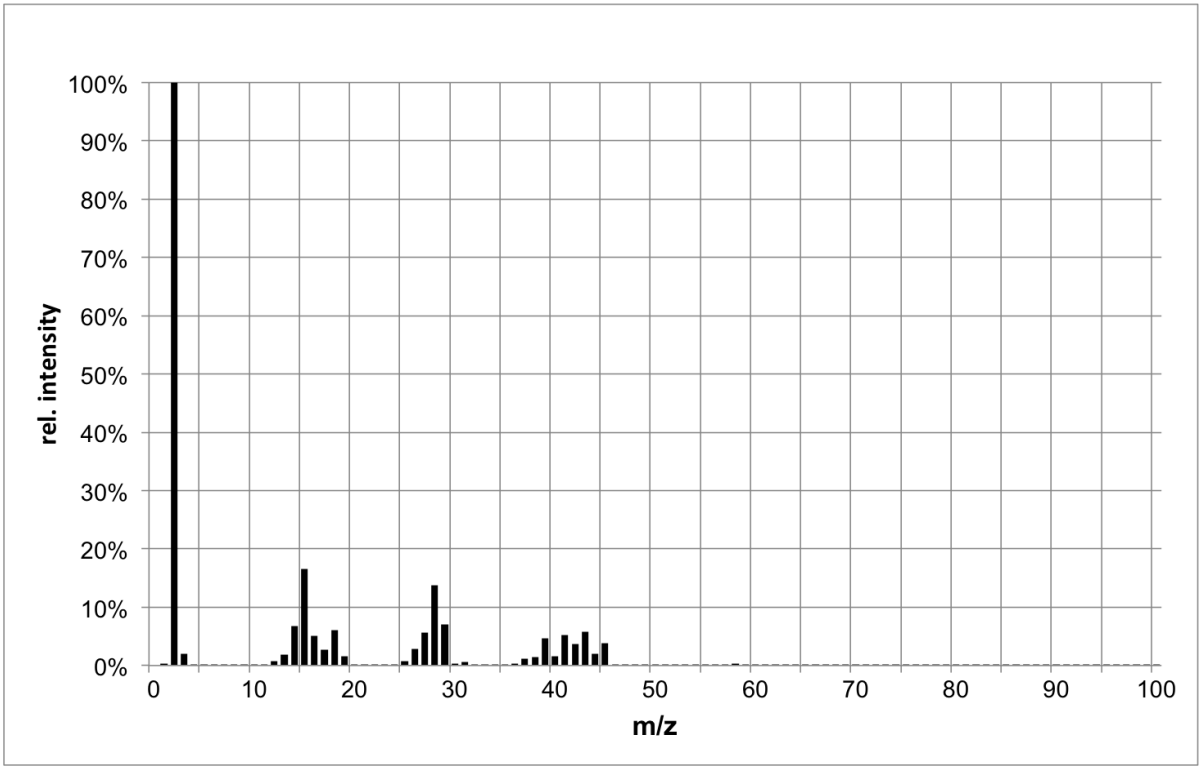

Figure S3. *In-situ* mass spectrometical analysis of the gas phase during the deposition process of $Ti(OPr^{i})_4$: m/z=2 (H_2^+), 18 (H_2O^+), 15 (CH_3^+), 42 ($C_3H_5^+$), 45 ($C_2H_6O^+$), 59 ($C_3H_7O^+$).