Supporting Information

NiO nanosheets as efficient hole transporter for carbon counter electrode based perovskite solar cells

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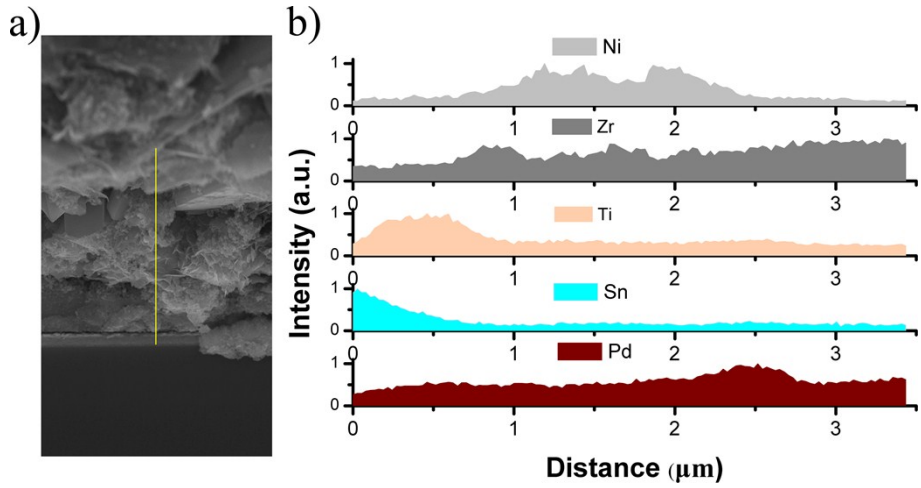

Fig. S1 a) Cross-sectional scanning electron micrograph (SEM) of NiO nanosheets based device and b) Distribution of components Ni, Zr, Ti, Pb and Sn, in NiO nanosheets based device obtained by line scan analysis of energy-dispersive x-ray (EDX) spectroscopy.

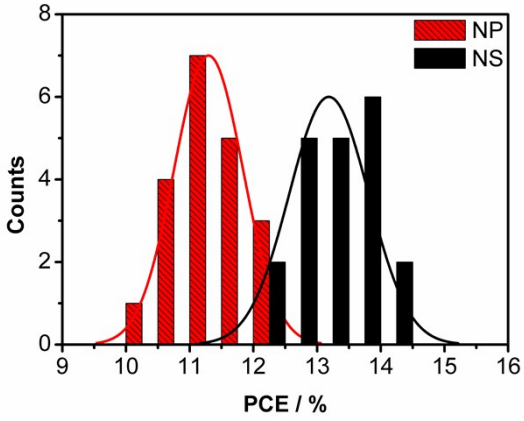

Fig. S2 Histogram of power conversion efficiency (PCE) for 20 pieces of NiO nanoparticles (NP, red) based devices and NiO nanosheets (NS, black) based devices.

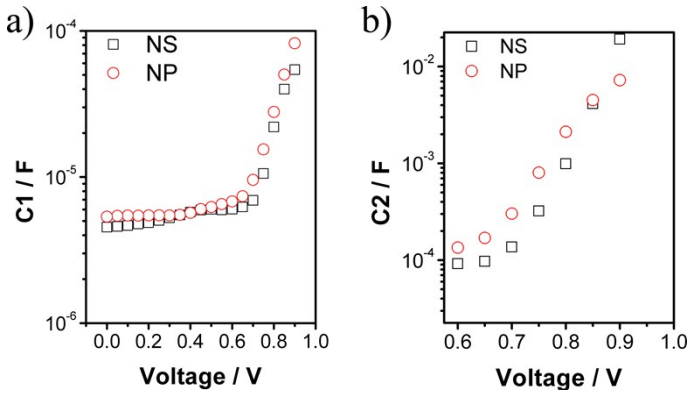

Fig. S3 Plot of capacitance C1 for the NiO/perovskite interface and C2 for the ionic motion in perovskite of NiO nanosheets device (NS, black square) and NiO nanoparticle device (NP, red circle) obtained from impedance measurements under illumination at given bias.

Tale S1. BET results for NiO nanosheets and NiO nanoparticles powder.

	Surface area (m^2 g^{-1}) powder
NiO nanosheets	56.20
NiO nanoparticles	77.89

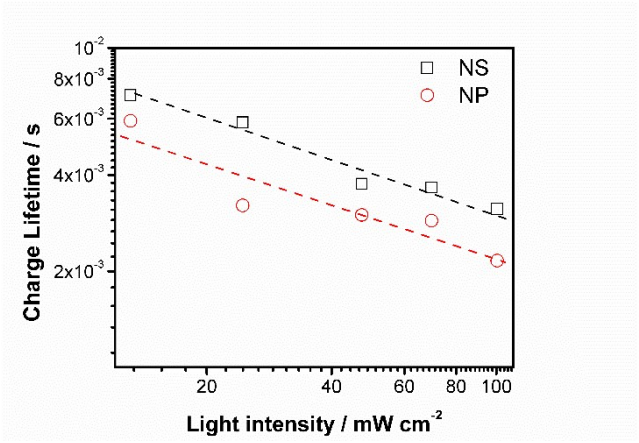

Fig. S4 Charge lifetime versus light intensity from transient photovoltage decay measurements of NiO-NS device (NS, black square) and NiO-NP device (NP, red circle).

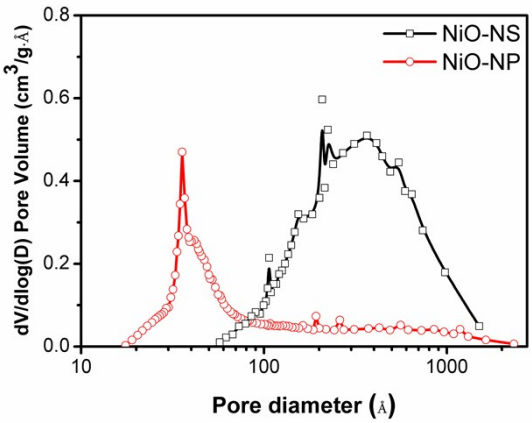

Fig. S5 Pore-size distribution of NiO nanosheets (NiO-NS) powder and NiO particles (NiO-NP) powder from BET measurements.

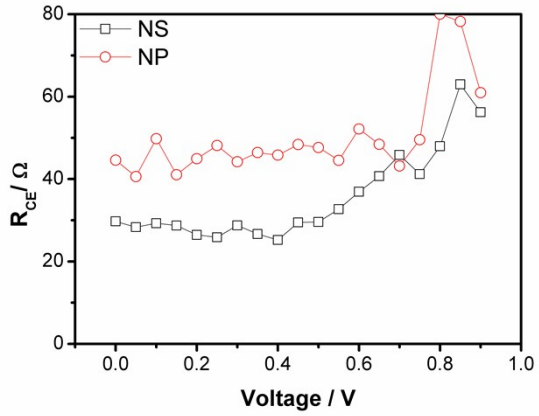

Fig. S6 Plot of R_{CE} for the NiO nanosheets device (NS, black square) and NiO nanoparticle device (NP, red circle) obtained from impedance measurements under illumination at given bias.