Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

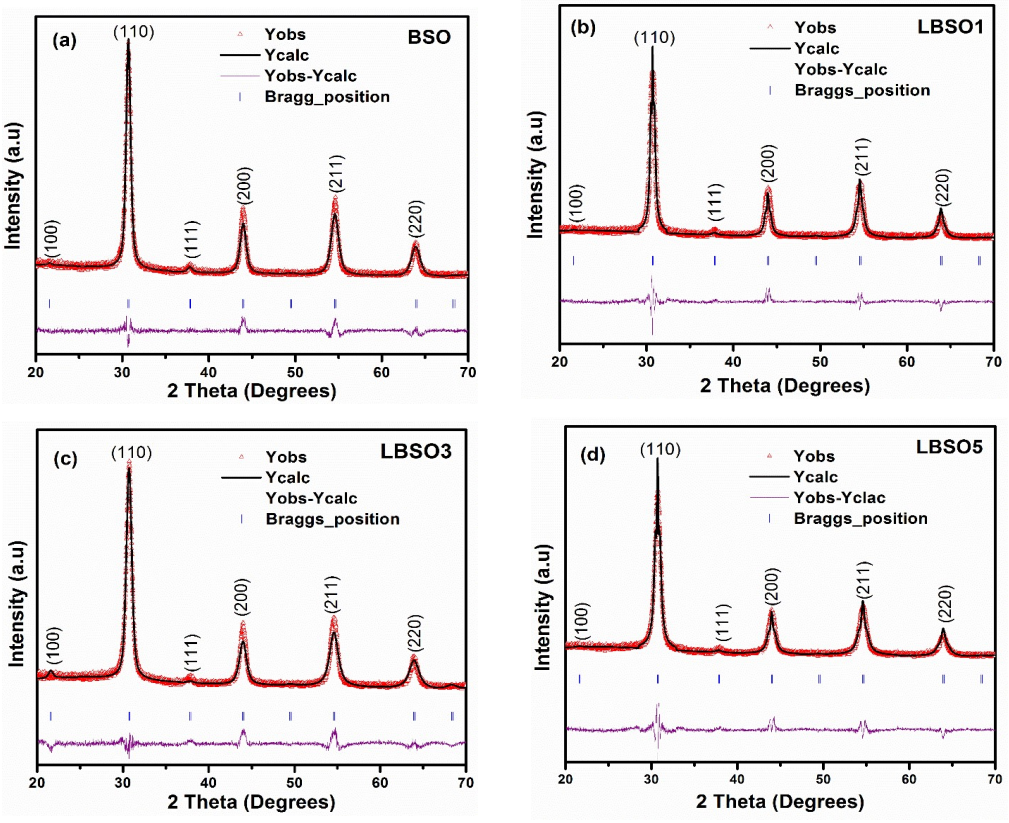
Nanostructured ternary perovskite oxides as photoconversion efficiency enhancers for DSSC

Nandarapu Purushotham Reddy[a], Rompivalsa Santhosh[b], Suresh Thogiti[b], Reddivari. Muniramaiah[a], D. Paul Joseph[a*], Banavoth Murali[b*]

[a]*Department of Physics, National Institute of Technology, Warangal, 506004, India*
[b]*Solar cells and Photonics Research Laboratory, School of Chemistry, University of Hyderabad, Hyderabad-500046, Telangana, India*

**Corresponding author e-mail: murali.banavoth@uohyd.ac.in and paul@nitw.ac.in*

XRD analysis:



Device ID	Dye loading (ε x 10^5 $M^{-1}cm^{-1}$)
TCL/BSO/TCL	0.254
TCL/LBSO1/TCL	0.275
TCL/LBSO3/TCL	0.296
TCL/LBSO5TCL	0.262

Fig. S1: Rietveld refinement XRD analysis of (a) BSO, (b) LBSO1, (c) LBSO3 and (d) LBSO5 nanocrystalline samples.

Table S1: Dye loading values of all the La doped $BaSnO_3$ electrodes.

Mott-Schottky plot and Energy level bands of La doped $BaSnO_3$:

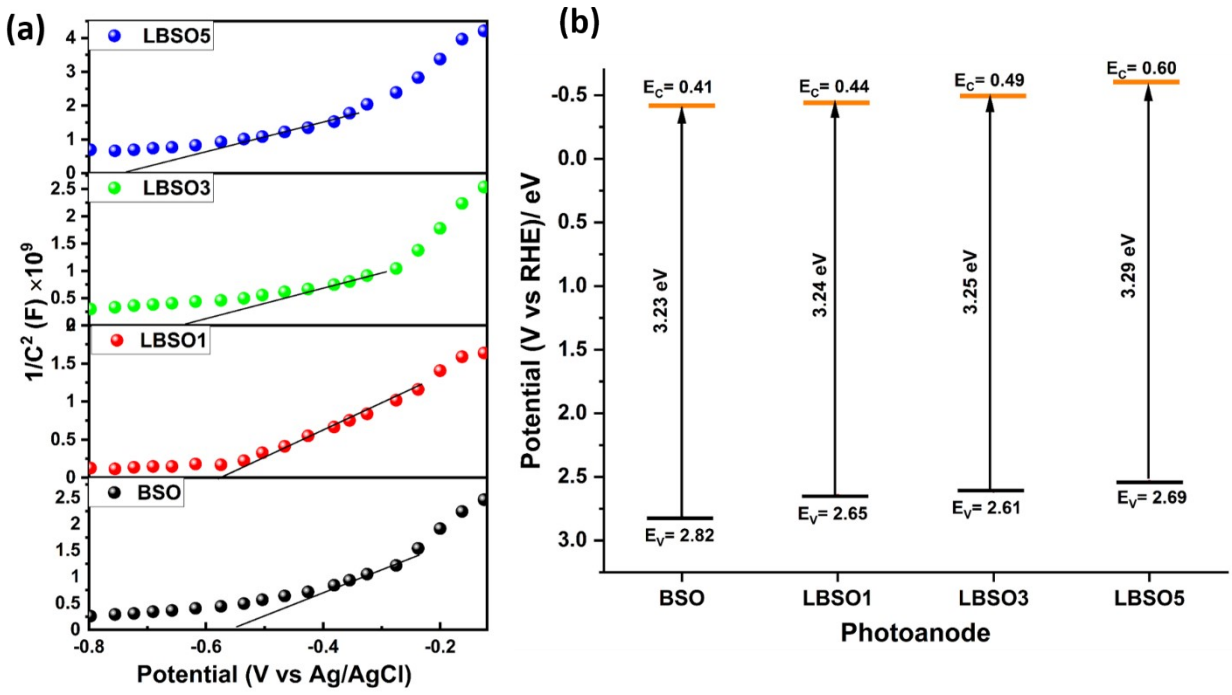


Fig. S2. (a) Mott-Schottky cuves and (b) Band band level alignment of $Ba_{1-x}La_xSnO_3$ (x = 0 to 0.05) electrodes.

XPS analysis:

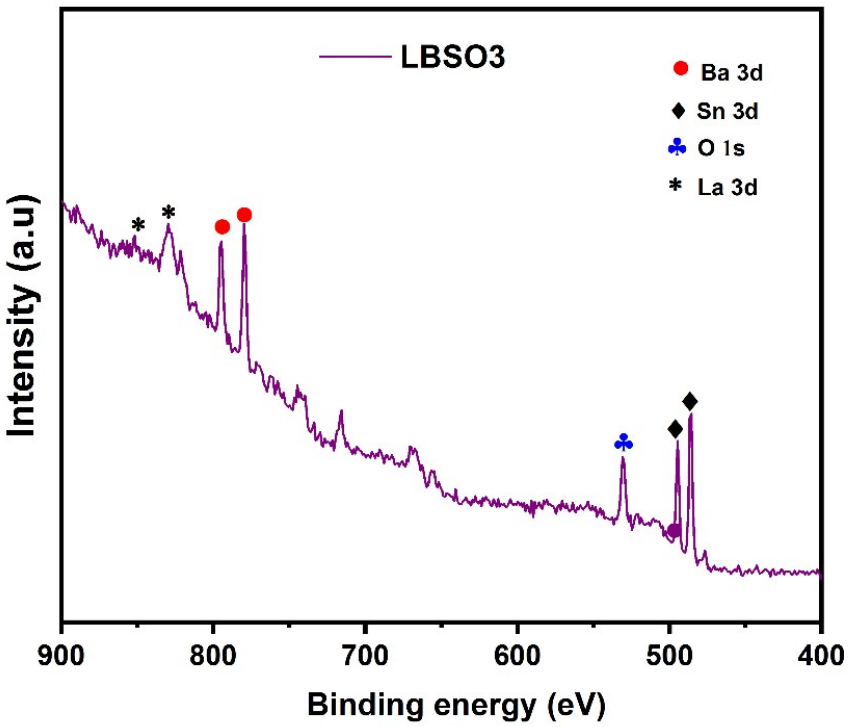


Fig. S3. The XPS survey spectrum of nanostructured LBSO3 sample.

I-V characteristics:

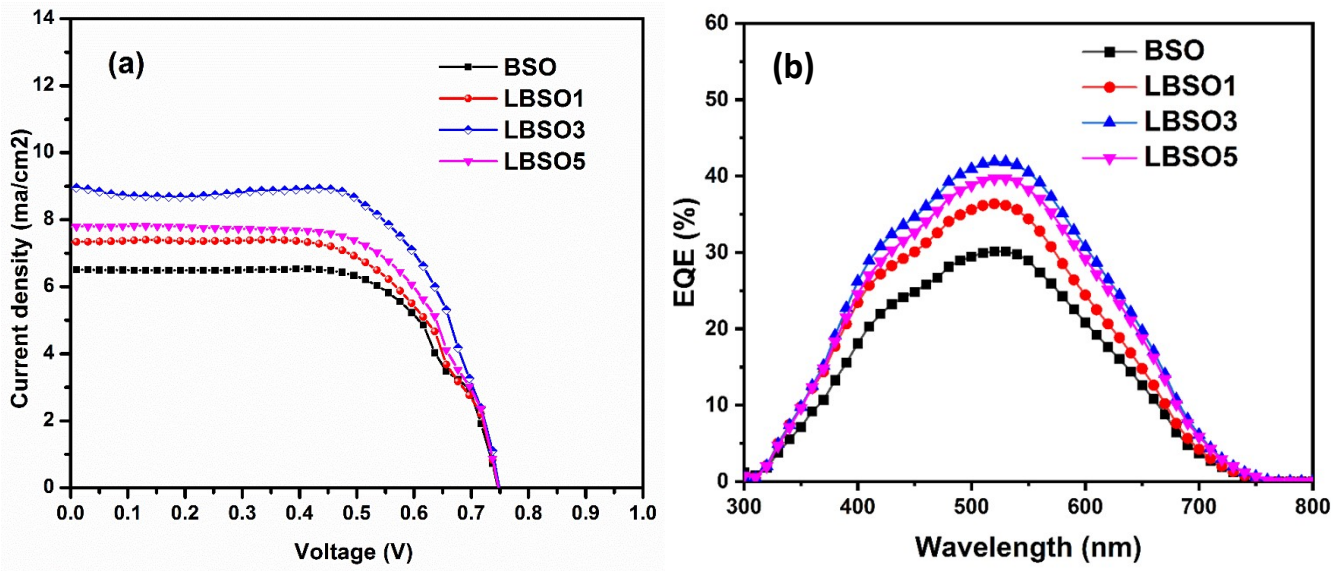


Fig. S4. (a) Photocurrent density-voltage (J-V) curves of DSSCs fabricated with pre $TiCl_4$ treated BSO and LBSOx (x = 1, 3, and 5) used as photoanodes, (b) External quantum efficiency (EQE) measurements of BSO and LBSO samples.

Device Name	**V_{OC} (V)**	**J_{SC} (mA/cm²)**	**FF (%)**	**η (%)**

Table S2: The current density-voltage (J-V) parameters of pre $TiCl_4$ treated nanostructured BSO and LBSOx (x = 1, 3, and 5) photo anode based DSSC devices.

TCL/BSO	0.737	6.50	67.42	3.23
TCL/LBSO1	0.738	7.33	64.23	3.48
TCL/LBSO3	0.742	8.95	65.73	4.37
TCL/LBSO5	0.739	7.79	65.36	3.76

Device name	Charge collection efficiency (η_{cc} %)	Charge injection efficiency (-ΔG_{inj}) (eV)
TCL/BSO/TCL	51.59	0.40
TCL/LBSO1/TCL	55.47	0.37
TCL/LBSO3/TCL	59.92	0.32
TCL/LBSO5/TCL	53.24	0.21

Table S3: The charge collection (η_{cc} %) and injection (ΔG_{inj}) efficiency values of pre and post surface treated photoanodes based devices.

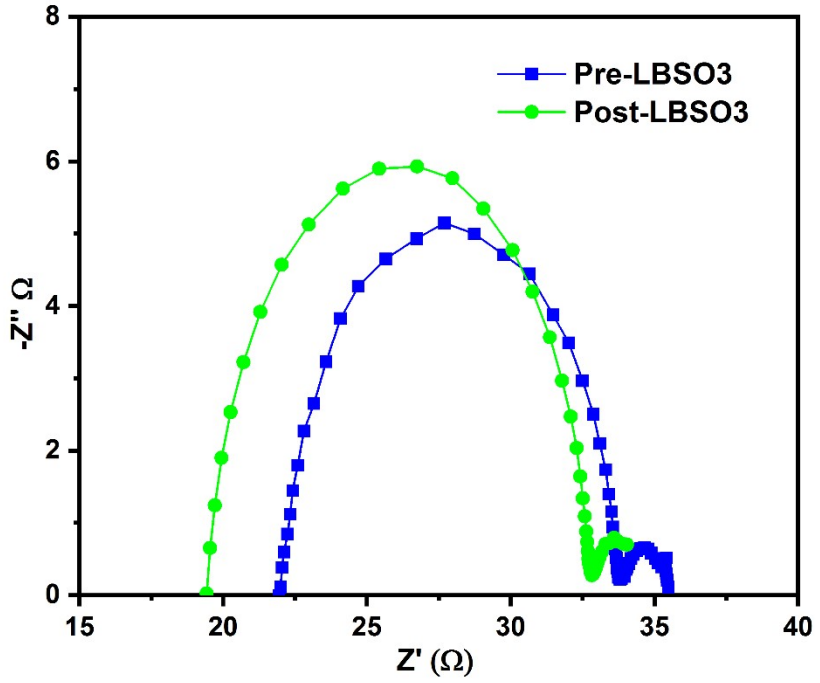


Fig. S5: The comparison of Nyquist plot of fabricated DSSC cells using pre and post treated LBSO3 (TCL/LBSO3 and TCL/LBSO3/TCL) photoanodes.