

Influence of La³⁺Induced Defects on MnO₂-Carbon Nanotube Hybrid Electrode for Supercapacitor

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Schematics of the Synthesis process:

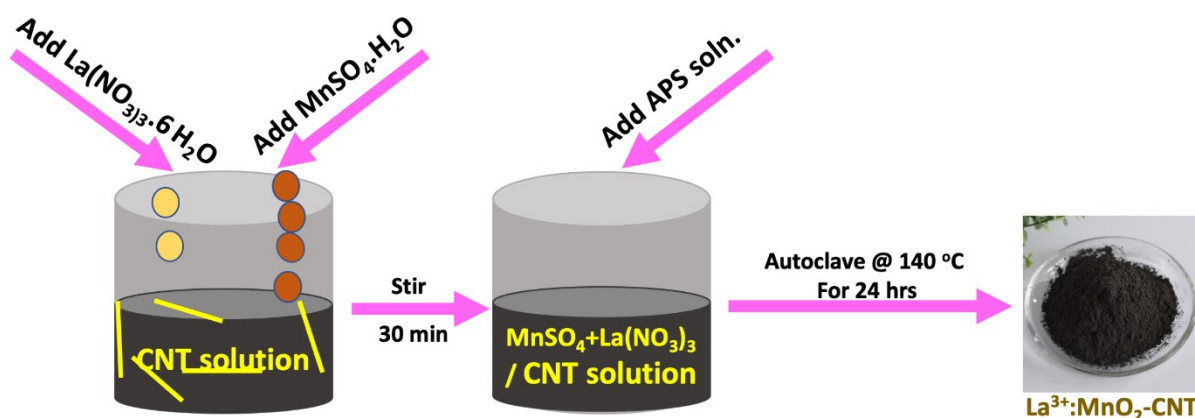


Figure S1: A flowchart showing the various steps of synthesis of the La doped MnO₂-CNT nanohybrid electrode

XPS analysis:

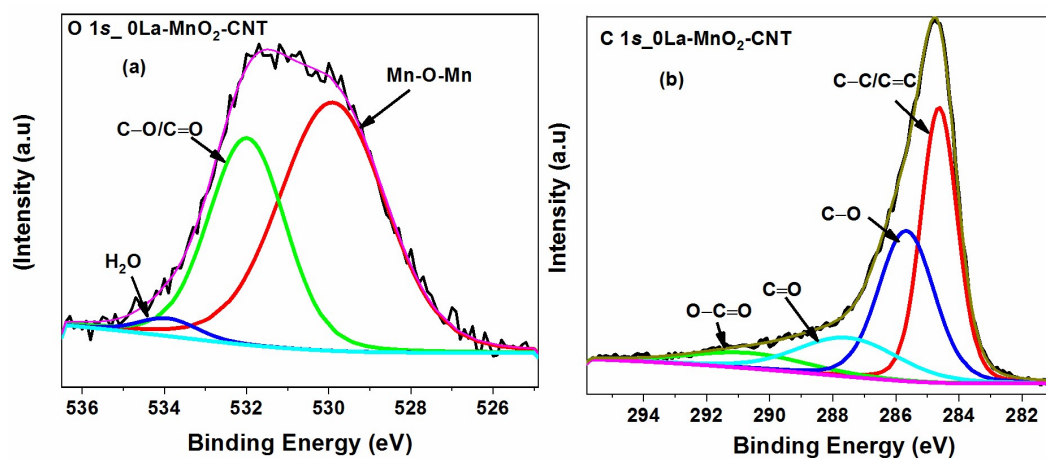


Figure S2: O 1s(a); C 1s(b) spectra of 0La-MnO₂-CNT

The deconvoluted XPS spectra of O 1s and C 1s states of the 0La-MnO₂-CNT are presented in Figure S2 (a), and (b), respectively whereas the deconvoluted O 1s, C 1s and La 3d_{3/2} of 2La-MnO₂-CNT nanohybrid are presented in Figure S3(a), (b), and (c), respectively. The C 1s spectra of both the samples (figure S2(b) and S3(b)) are almost identical as they both show components due existence of C-C/C=C, C-OH, C=O and O-C=O bonds originating from the functionalised MWCNTs present within the nanohybrids[1]. The O 1s spectrum (figure S2(a)) shows three peaks centred at 529.7 eV, 531.8 eV and 532.4 eV due to Mn-O-Mn, C-O/C=O and H₂O, respectively. However, for the 2 % La doped sample (figure S3(a)), an additional component peaked at 531 eV is observed whose origin may be linked with the existence of some amorphous La(OH)₃[2-3] for which a further support is found from the XPS spectrum of the La 3d_{3/2} region (figure S3(c)) in which a weak and broad peak centred at 853.9 eV indicates the existence of small amounts of La+3 states [4].

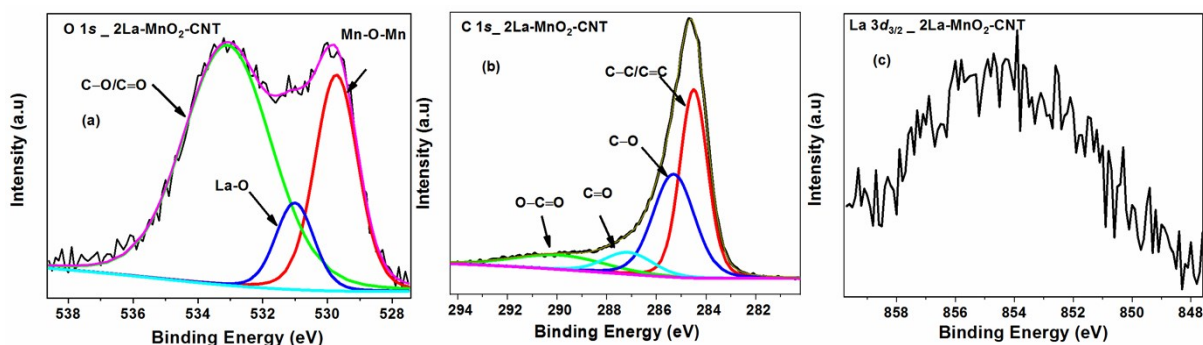


Figure S3: O1s (a); C 1s (b); and La 3d_{3/2}(c) spectrum of 2La- MnO₂-CNT

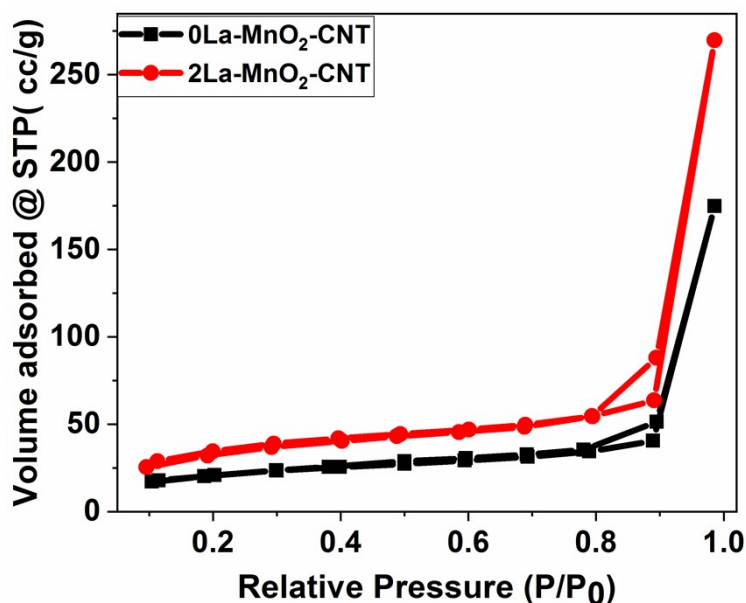


Figure S4: BET adsorption isotherms of undoped MnO₂-CNT and 2La- MnO₂-CNT

Ragone plot:

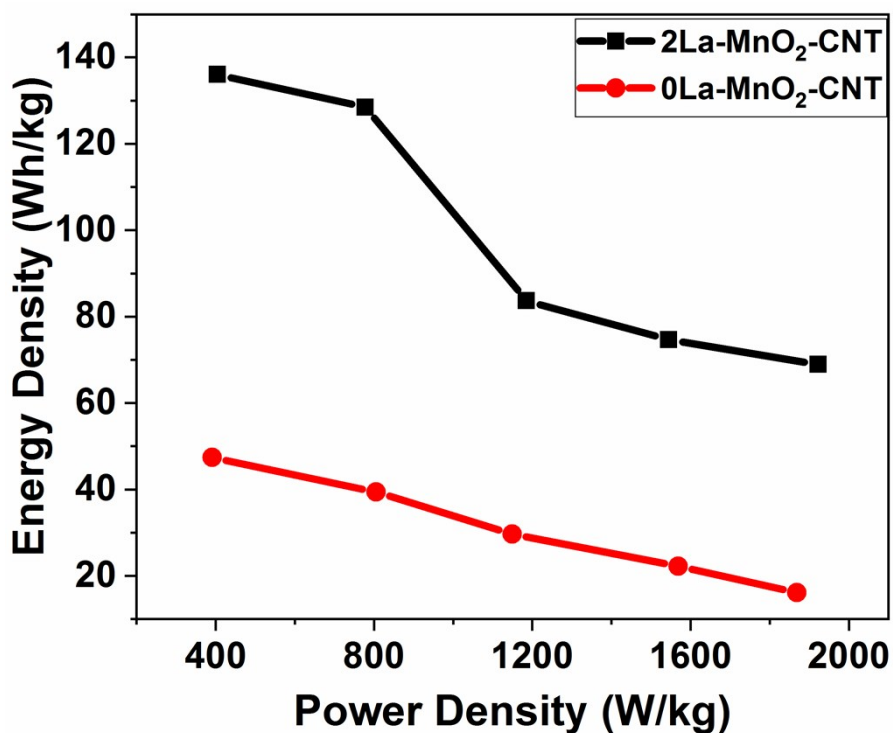


Figure S5: Ragone plot for undoped and 2La- MnO₂-CNT nanohybrid.

Reference

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