

Supplementary Materials

Enhanced Electrochemical Behavior of Peanut-Shell Activated Carbon/Molybdenum Oxide/Molybdenum Carbide Ternary Composites

Ndeye F. Sylla ¹, Samba Sarr ¹, Ndeye M. Ndiaye ², Bridget K. Mutuma ¹, Astou Seck ³, Balla D. Ngom ², Mohamed Chaker ³ and Ncholu Manyala ^{1,*}

¹ Department of Physics, Institute of Applied Materials, SARChI Chair in Carbon Technology and Materials, University of Pretoria, Pretoria 0028, South Africa; ntoufasylla@gmail.com (N.F.S.); ssarr3112@gmail.com (S.S.); bridgetmutuma@gmail.com (B.K.M.)

² Laboratoire de Photonique Quantique, d'Energie et de Nano-Fabrication, Faculté des Sciences et Techniques, Université Cheikh Anta Diop de Dakar (UCAD), Dakar-Fann Dakar B.P. 5005, Sénégal; nmaty.ndiaye@gmail.com (N.M.N.); balla.ngom@ucad.edu.sn (B.D.N.)

³ Institut National de la Recherche Scientifique Centre—Énergie Matériaux Télécommunications 1650, Boulevard Lionel Boulet, Varennes, QC J3X 1S2, Canada; astou.seck@emt.inrs.ca (A.S.); chaker@emt.inrs.ca (M.C.)

* Correspondence: ncholu.manyala@up.ac.za; Tel.: +27-12-420-3549; Fax: +27-12-420-2516

Table S1. Composition (at.%) of the PAC/MoO₂/Mo₂C ternary composites.

Peaks	Assignement	Composition (at.%)		
		PAC/MoO ₂ /Mo ₂ C-0.5	PAC/MoO ₂ /Mo ₂ C-1	PAC/MoO ₂ /Mo ₂ C-2
C 1s	C=C; C-C	62.25	49.35	52
	C-OH; O-C=O	11.51	3.22	9.54
	C-Mo ₂	1.53	9.74	0.57
Mo 3d	Mo ⁴⁺	2.12	4.99	4.4
	Mo ⁵⁺	0.96	6.74	4.59
	Mo ⁶⁺	0.83	1.05	0.26
	Mo ₂ -C	1.89	2.23	0.43
O 1s	Mo-O	4.41	14.26	10.45
	O-C; O-C=O	15.86	8.42	17.77

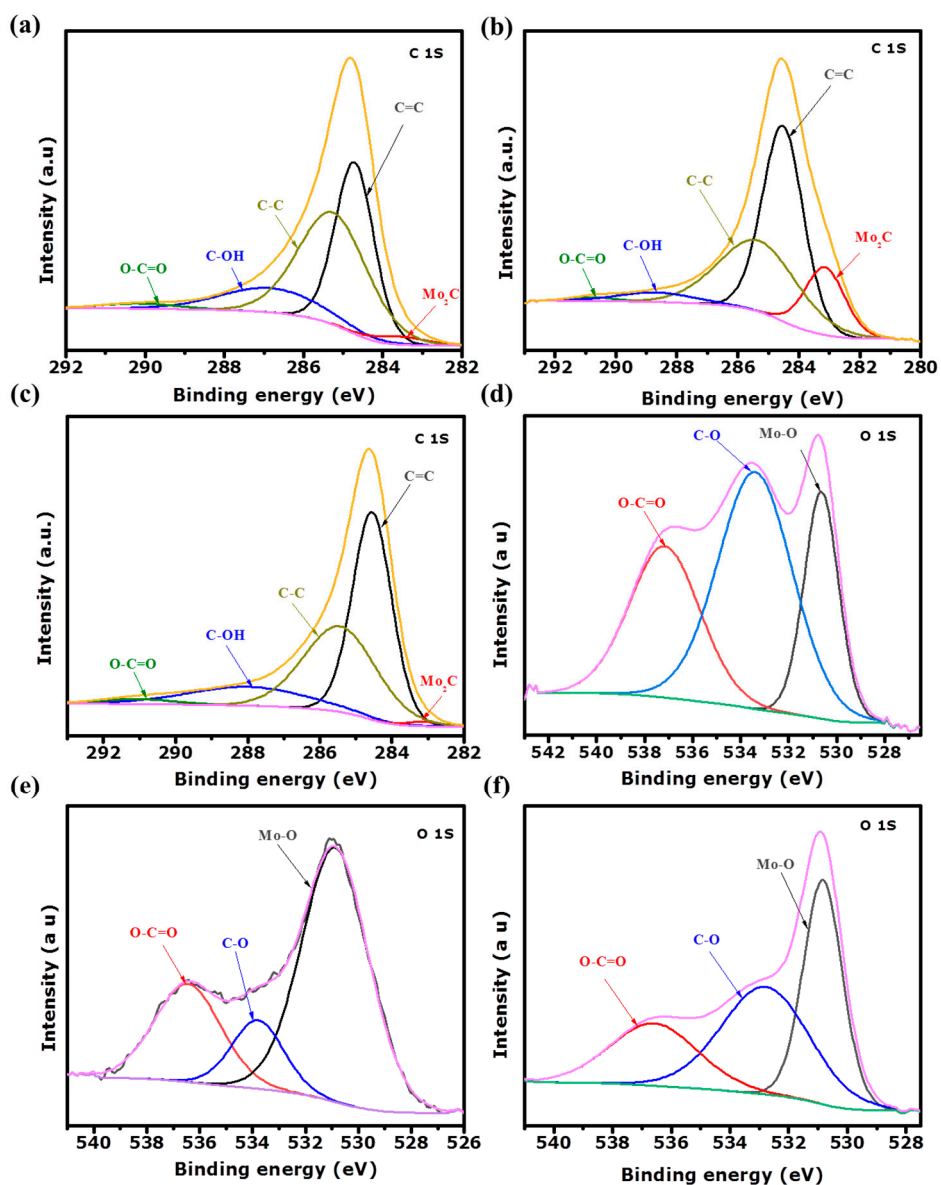


Figure S1. High resolution XPS spectra C 1s and O 1s of (a,d) PAC/MoO₂/Mo₂C-0.5 (b,e) PAC/MoO₂/Mo₂C-1 (c,f) PAC/MoO₂/Mo₂C-2 ternary composites.

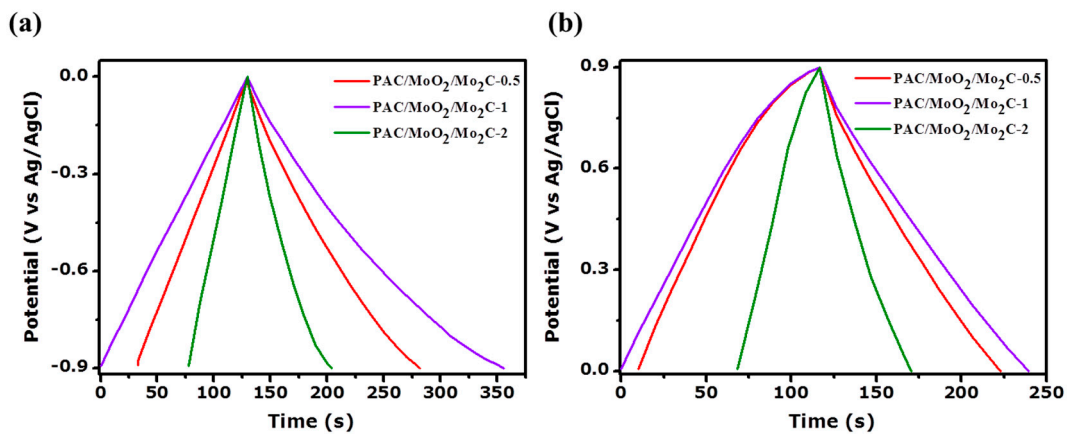


Figure S2. Galvanostatic charge-discharge curves at 1 A g⁻¹ (a) in -0.9–0.0 V negative and (b) 0.0–0.9 V positive potential windows of the PAC/MoO₂/Mo₂C ternary composites in three-electrode configuration.

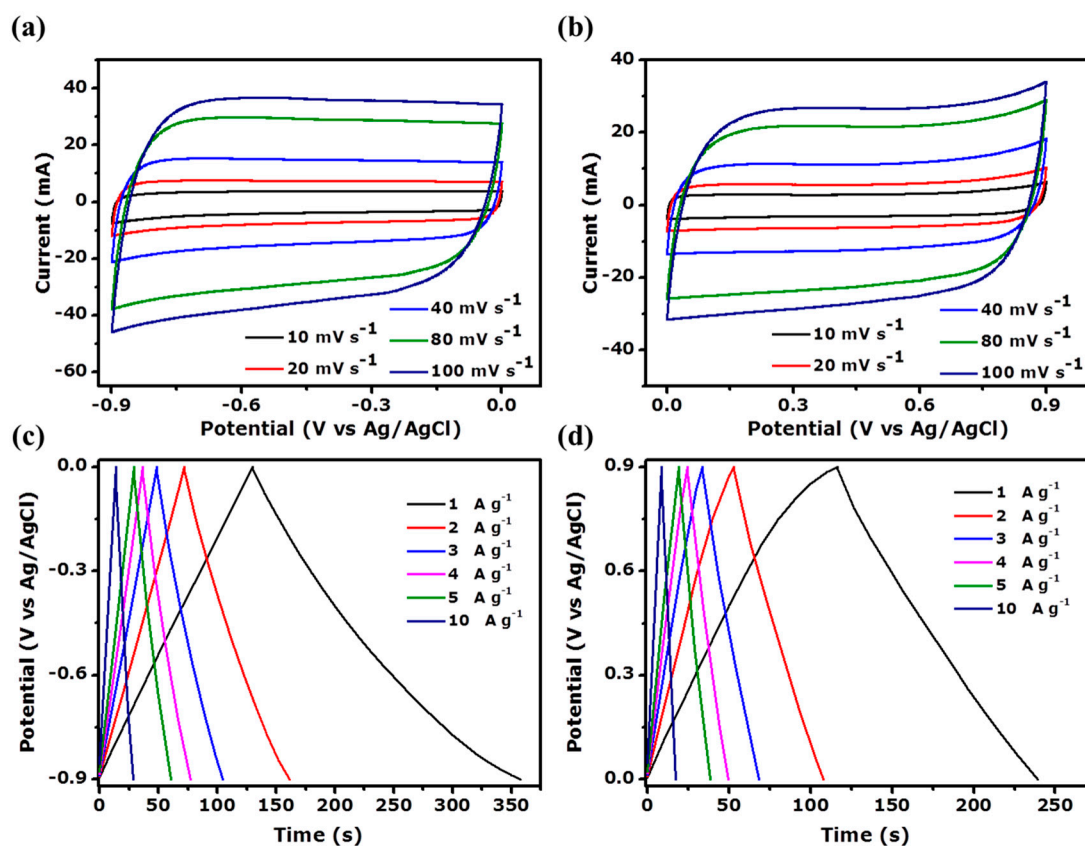


Figure S3. (a,b) CV plots at different scan rate from 10 to 100 mV s⁻¹ in (-0.9–0.0 V) and (0.0–0.9 V) operating potential, (c,d) GCD curves at different specific currents ranging from 1 to 10 A g⁻¹ in (-0.9–0.0 V) and (0.0–0.9 V) operating potential of the PAC/MoO₂/Mo₂C-1 ternary composite in three-electrode configuration.

Table S2. Comparison of electrochemical performance of Mo-based composite with carbon material in aqueous electrolyte.

Materials	Voltage (V)	Electrolyte	Specific current (A g ⁻¹)	Specific energy (Wh kg ⁻¹)	Specific power (W kg ⁻¹)	Capacitance retention (%) / cycles	Ref.
PAC/MoO ₂ /Mo ₂ C-1	0–1.8	2.5 M KNO ₃	1	51.8	900	83 25,000	This work
MoS ₂ /MoO ₂ @CNT	0–1.8	6 M KOH	0.25	11.88	2000	102.2 10,000	[1]
MoO ₂ @C/CNT	0–1.4	3 M KOH	1	25.1	704.23	87.1 2000	[2]
MoP/MoO ₂ /CNT	0–1.5	6 M KOH	0.25	31.6	190	86.5 10,000	[3]
MoO ₂ -G	-0.8–0.9	1 M Na ₂ SO ₄	1	22.6	5774	92.5 1000	[4]
Mo ₂ C@CNT	-0.4–0.6	1 M KOH	1	50.9	500	97 5000	[5]
Mo-based/CNs	0–1.6	6 M KOH	1	30.8	800	97.5 5000	[6]

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