

## Supporting Information (SI)

### Calcined chicken eggshell electrode for battery and supercapacitor applications

<sup>1</sup>Manickam Minakshi\*, <sup>1</sup>Stephen Higley, <sup>2</sup>Christian Baur, <sup>3</sup>David R.G. Mitchell, <sup>4</sup>Robert T. Jones, and <sup>2</sup>Maximilian Fichtner

<sup>1</sup>Engineering and Energy, Murdoch University, WA 6150, Australia

<sup>2</sup>Helmholtz Institute Ulm for Electrochemical Energy Storage (HIU), 89081 Ulm, Germany

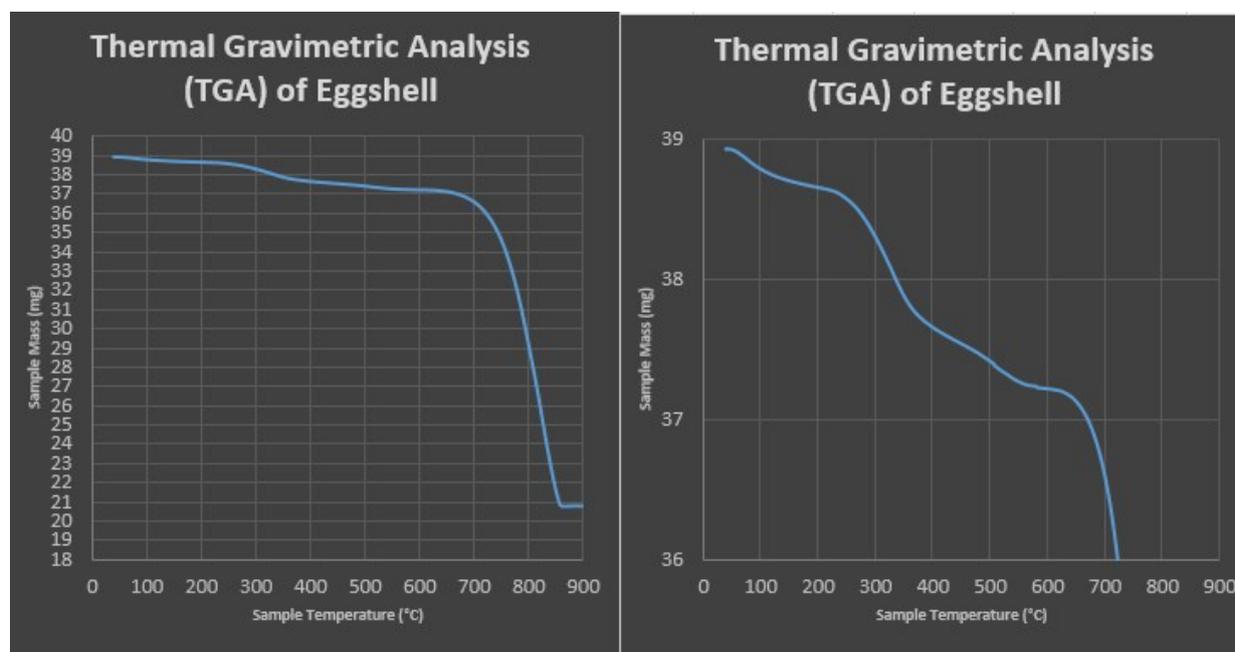
<sup>3</sup>Electron Microscopy Centre, University of Wollongong, NSW 2500, Australia

<sup>4</sup>Centre for Materials and Surface Science, La Trobe University, VIC 3086, Australia

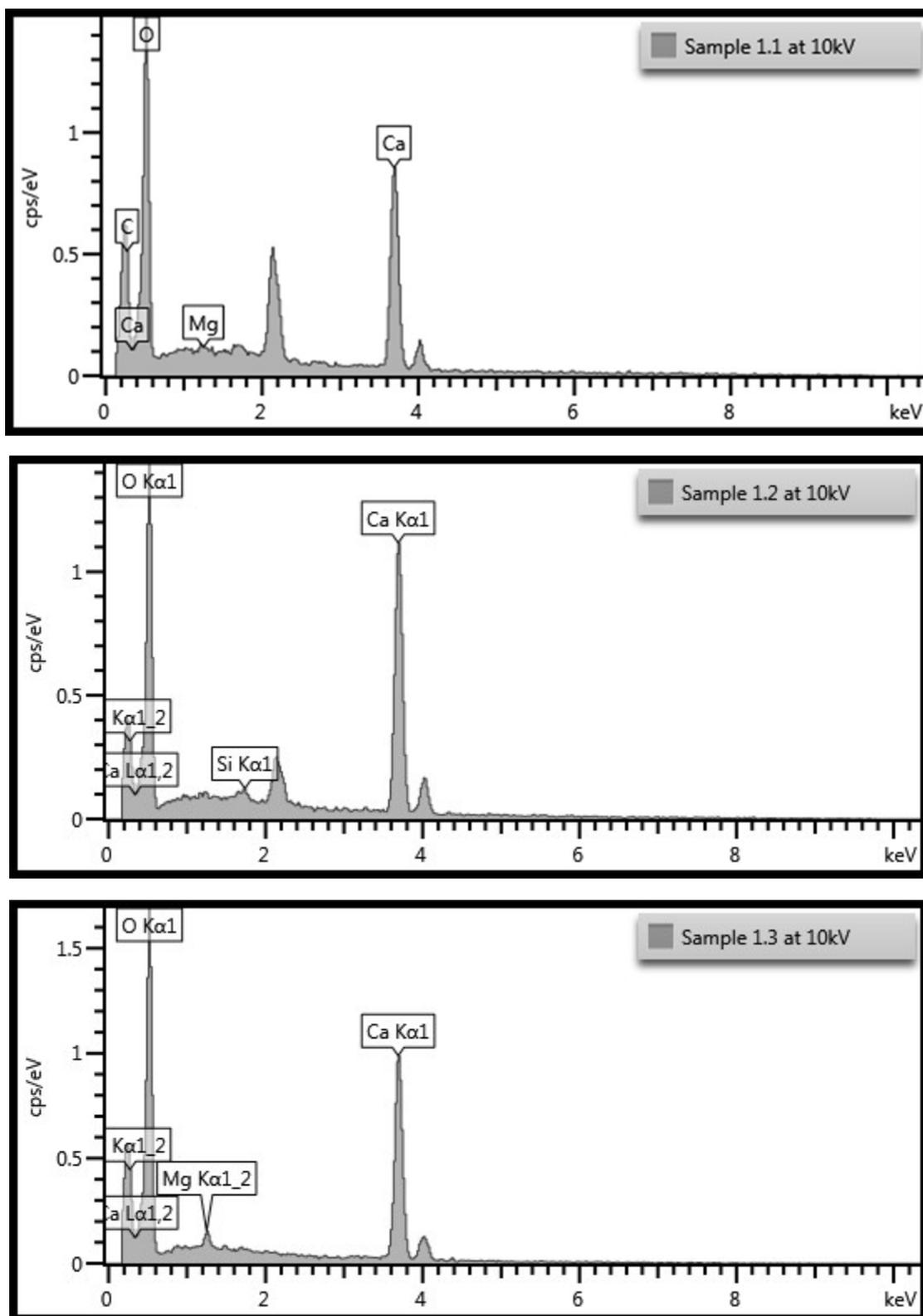
This supporting information (SI) comprises one table and four figures

**Table S1** XPS elemental fractions and chemical states of chicken eggshell powder

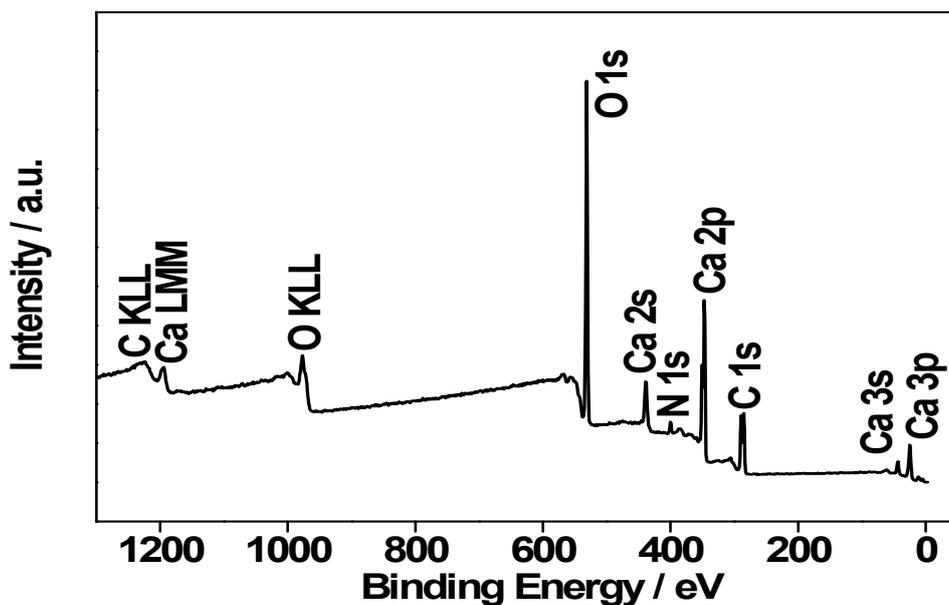
Eggshell powder samples	Chemical state / Atom Fractions (%) / Relative Concentrations (%)											
	Wide (survey) spectrum					C (1s)				O (1s)		
	O 1s	Ca 2p	C 1s	N 1s	Mg 1s	C—C	CO <sub>3</sub>	C-O	C=O/ O-C-O	CaCO <sub>3</sub> / CaO	Inorganic O	Organic O
As-crushed	45.3	12	40.5	2.2		38.4	38.6	13.7	6.8	82.1	14.2	3.7
Calcined at 600 °C	51	13.7	32.8	0.2	0.5	42.4	47.0	8.9	1.8	79.1	16.5	4.4
Calcined at 900 °C	50.1	15.4	33.8	0	0.7	49.8	38.7	8.6	2.9	86.0	11.0	3.0



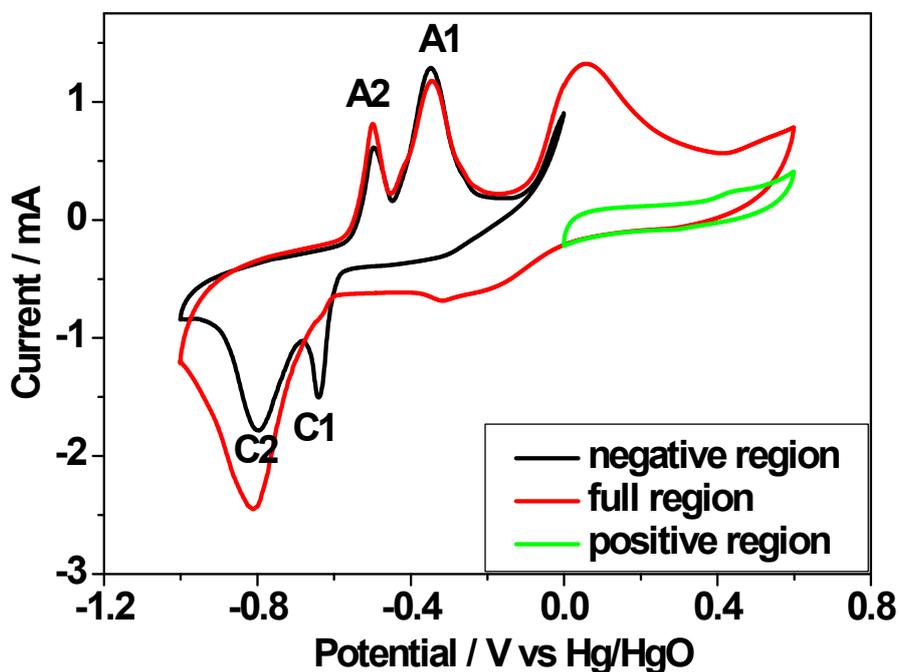
**Figure S1** Thermo-gravimetric (blue curve) (TGA) of the chicken eggshell powder showing a stability until 700° C and from thereon a significant weight loss is observed indicating a phase change from CaCO<sub>3</sub> to CaO. For clarity, magnified plot is provided (right).



**Figure S2** Elemental dispersive analysis (EDS) of chicken eggshell (a) as-crushed; and calcined at: (b) 600 and (c) 900 °C. EDS analysis showing the elemental composition of Ca, and O. The as-crushed eggshell also show Mg and C as other minor components.



**Figure S3** Wide scan XPS spectra of chicken eggshell as-crushed powder showing the elements present in the shell.



**Figure S4** CV curves of chicken eggshell (three-electrode configuration) in (a) positive potential window green (0.5 V); (b) negative potential window black (-1.0 V); and (d) full region comprising both positive and negative red (1.5 V) in NaOH aqueous electrolyte. The CV in the negative and full region show redox behaviour with reduction (C1, C2) and oxidation (A1, A2) peaks.