

Materials List for:

In Situ Neutron Powder Diffraction Using Custom-made Lithium-ion Batteries

William R. Brant¹, Siegbert Schmid¹, Guodong Du², Helen E. A. Brand³, Wei Kong Pang^{2,4,5}, Vanessa K. Peterson⁴, Zaiping Guo^{2,5}, Neeraj Sharma⁶

¹School of Chemistry, University of Sydney

²Institute for Superconducting & Electronic Materials, University of Wollongong

³Australian Synchrotron

⁴Australian Nuclear Science and Technology Organisation

⁵School of Mechanical, Materials, and Mechatronic Engineering, University of Wollongong

⁶School of Chemistry, University of New South Wales

Correspondence to: Neeraj Sharma at neeraj.sharma@unsw.edu.au

URL: <https://www.jove.com/video/52284>

DOI: [doi:10.3791/52284](https://doi.org/10.3791/52284)

Materials

Name	Company	Catalog Number	Comments
Slurry Preparation			
PVDF	MTI Corporation	EQ-Lib-PVDF	http://www.mtixtl.com/PVDFbinderforLi-ionbatteryelectrodes80g/bag-EQ-Lib-PVDF.aspx
Active Electrode Material	Researcher makes*		This is dependent on the electrode under investigation, typically made in-house by the researcher and varies every time
Carbon black	MTI Corporation	EQ-Lib-SuperC65	http://www.mtixtl.com/TimicalSUPER65forLithium-IonBatteries80g/bag-EQ-Lib-SuperC65.aspx
NMP	MTI Corporation	EQ-Lib-NMP	http://www.mtixtl.com/N-Methyl-2-pyrrolidoneNMPsolventforPVDF250g/bottleLib-NMP.aspx
Magnetic stirrer	IKA	C-MAG HS 7 IKAMAG	http://www.ika.in/owa/ika/catalog.product_detail?iProduct=3581200
Electrode Fabrication			
Doctor blade (notch bar)	DPM Solutions Inc.	100, 200, 300 & 400 micron 4-Sided Notch Bar	
Al or Cu current collectors	MTI Corporation	EQ-bcaf-15u-280	http://www.mtixtl.com/AluminumFoilforBatteryCathodeSubstrate-EQ-bcaf-15u-280.aspx
Vacuum Oven	Binder	e.g. VD 53	http://www.binder-world.com/en/vacuum-drying-oven/vd-series/vd-53/
Flat-plate press	MTI Corporation	EQ-HP-88V-LD	http://www.mtixtl.com/25THydraulicFlatHotPress-EQ-HP-88V.aspx
Roll-over cell construction			
V can			
electrode on Al/Cu	MTI Corporation	EQ-bcaf-15u-280	http://www.mtixtl.com/AluminumFoilforBatteryCathodeSubstrate-EQ-bcaf-15u-280.aspx
polyethylene-based or PVDF membrane	MTI Corporation	EQ-bsf-0025-400C	http://www.mtixtl.com/separatortfilm-EQ-bsf-0025-400C.aspx

LiPF ₆	Sigma-Aldrich	450227	http://www.sigmaaldrich.com/catalog/product/aldrich/450227?lang=en&region=AU
deuterated dimethyl carbonate	Cambridge Isotopes	DLM-3903-PK	http://shop.isotope.com/productdetails.aspx?id=10032379&itemno=DLM-3903-PK
deuterated ethylene carboante	CDN Isotopes	D-5489	https://www.cdnisotopes.com/as/products/specifications/D-5489.php?ei=YWVraWmjoJ1i0lZ7nkr0RpwHrHxc9ornu14O4WUtZKbZWZrcq6j55G0lOab3Wi0dMZ7xc+0Yse1leWVtZLnrGKvta7v591o4JrnkbRowHt/r
Li metal foil	MTI Corporation	Lib-LiF-30M	http://www.mtixtl.com/Li-Foil-30,000-ml-35-mmW-0.17-mm-Th.aspx
Rubber stopper cut to size	generic eraser		cut a generic eraser to size
dental wax	Ainsworth Dental	AIW042	http://www.ainsworthdental.com.au/catalogue/Ainsworth-Modelling-Wax-500g.html
Copper wire (insulated)	generic		sheathed Cu wire that can be cut to size
Aluminum rod (<2 mm diameter)	generic		cut to size as required
Glovebox	Mbraun	UNILab	http://www.mbraun.com/products/glovebox-workstations/unilab-glovebox/
Scissors	generic		
Soldering iron	generic		
In situ NPD			
Appropriate neutron diffractometer	ANSTO	Wombat	http://www.ansto.gov.au/ResearchHub/Bragg/Facilities/Instruments/Wombat/
Potentiostat/galvanostat	Autolab	PGSTAT302N	http://www.ecochemie.nl/Products/Echem/NSeriesFolder/PGSTAT302N
Connections to battery from potentiostat/galvanostat	generic		
Training of NPD instrument and use			
Data analysis			
Data visualisation and peak fitting, .e.g. LAMP suite	ILL	LAMP	http://www.ill.eu/instruments-support/computing-for-science/cs-software/all-software/lamp/
Rietveld analysis software, e.g. GSAS	APS	GSAS	https://subversion.xray.aps.anl.gov/trac/EXPGU1