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Fluorination of Al₂O₃ Coating for Lithium-Ion Battery

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(54) Title: FLUORINATION OF AL₂O₃ COATING FOR LITHIUM-ION BATTERY

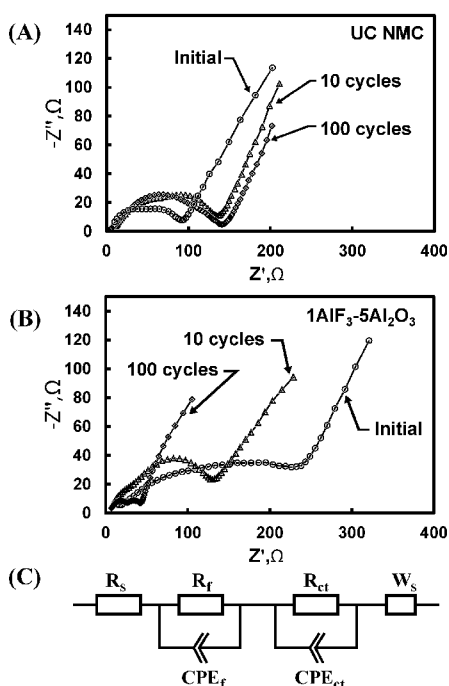


Fig. 10

(57) Abstract: Improving the performance of cathodes by using surface coatings has proven to be an effective method for improving the stability of Li-ion batteries (LIBs), while a high quality film satisfying all requirements of electrochemical inertia, chemical stability, and lithium ion conductivity has not been found. A composite film composed of Al₂O₃ and AlF₃ layers was coated on the surface of Li-rich NMC based electrodes by atomic layer deposition (ALD). The electrochemical characterization results indicated that the coating with 1 cycle of AlF₃ ALD on 5 cycles of Al₂O₃ ALD (1 AlF₃-5Al₂O₃) significantly improved the cycling stability and alleviated the voltage attenuation problem of Li-rich NMC based electrodes by suppressing side reactions between the electrolyte and electrode, as well as inhibiting the transformation of layered Li₂MnO₃ into a spinel-like phase.

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
 See Search History document

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 See Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ----- Y	US 2015/0180023 A1 (GM Global Technology Operations LLC) 25 June 2015 (25.06.2015) entirety of document especially para [0004]; [0038]; [0091]; [0102]	1-15, (16-20)/(1-15), 22/(1-15)
Y		21/(1-15)
Y	'Yu et al 'Structural Analysis of Li2MnO3 and Related Li-Mn-O Materials' Journal of the Electrochemical Society, 2011, Vol 158 pg A1015-A1022 especially Abstract, pg 1021 col 2 para 3	21/(1-15)
A	WO 2018/222366 A2 (The Board of Trustees of the Leland Stanford Junior University) 06 December 2018 (06.12.2018) entirety of document	1-22
A	US 2017/0338471 A1 (Battelle Memorial Institute) 23 November 2017 (23.11.2017) entirety of document	1-22
A	US 2014/0255798 A1 (UChicago Argonne LLC) 11 September 2014 (11.09.2014) entirety of document	1-22

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