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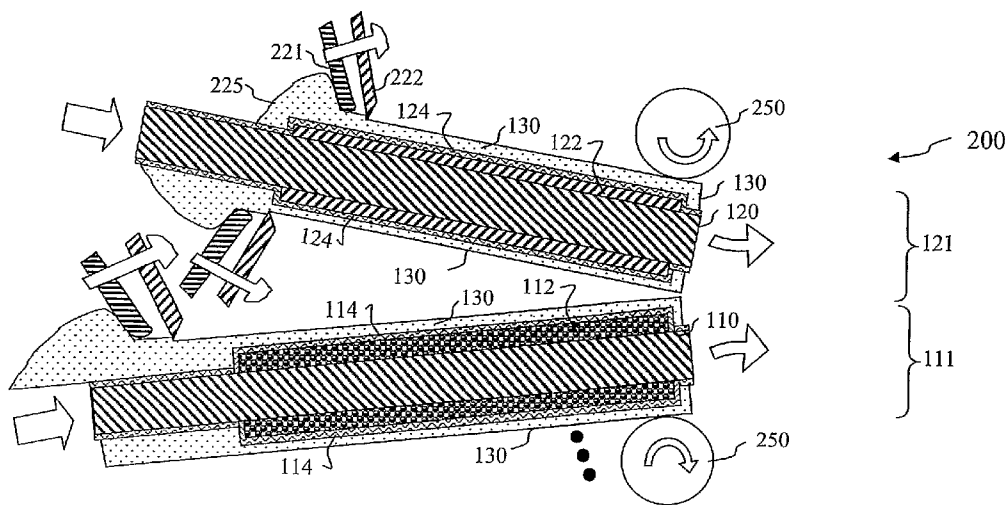
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(54) Title: THIN-FILM BATTERIES WITH POLYMER AND LIPON ELECTROLYTE LAYERS AND METHOD



(57) Abstract: A method and apparatus for making thin-film batteries having composite multi-layered electrolytes with soft electrolyte between hard electrolyte covering the negative and/or positive electrode, and the resulting batteries. In some embodiments, foil-core cathode sheets each having a cathode material (e.g., LiCoO₂) covered by a hard electrolyte on both sides, and foil-core anode sheets having an anode material (e.g., lithium metal) covered by a hard electrolyte on both sides, are laminated using a soft (e.g., polymer gel) electrolyte sandwiched between alternating cathode and anode sheets. A hard glass-like electrolyte layer obtains a smooth hard positive-electrode lithium-metal layer upon charging, but when very thin, have randomly spaced pinholes/defects. When the hard layers are formed on both the positive and negative electrodes, one electrode's dendrite-short-causing defects on are not aligned with the other electrode's defects. The soft electrolyte layer both conducts ions across the gap between hard electrolyte layers and fills pinholes.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
 IPC: H01M 6/46(2007.01),4/58(2007.01)

USPC: 429/231.9,231.8,231.4,245
 According to International Patent Classification (IPC) or to both national classification and IPC

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 EAST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2001/0041294A (CHU et al) 15 November 2001 (15.11.2001), paragraph 32.	1,4,5,7 & 18
Y		2-3, 6, 8-17 & 19-31
Y	US 6,818,356A (BATES) 16 November 2004, (16.11.2004), column 8, lines 5-15.	2-3,6,8-17 & 19-31

Further documents are listed in the continuation of Box C.

See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means		
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