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DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,  
HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR,  
KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG,  
MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM,  
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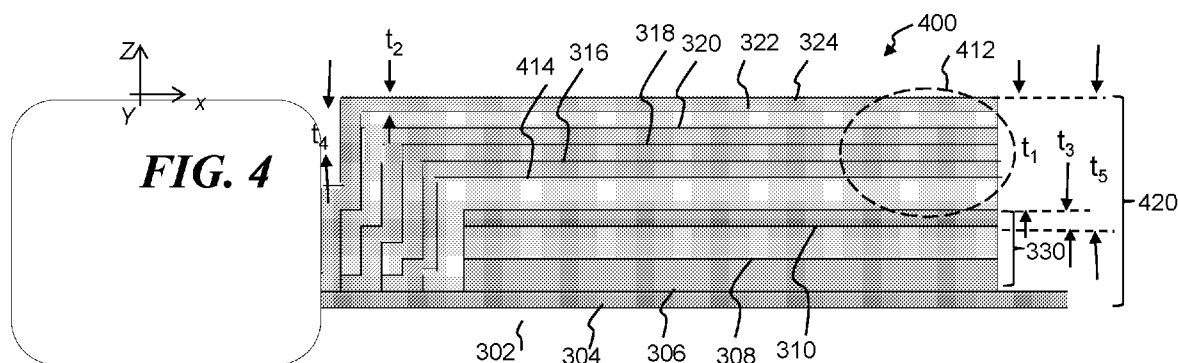
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(54) Title: MULTILAYER THIN FILM DEVICE ENCAPSULATION USING SOFT AND PLIABLE LAYER FIRST



(57) Abstract: A thin film device. The thin film device may include: an active device region, the active device region comprising a diffusant; and a thin film encapsulant disposed adjacent to the active device region and encapsulating at least a portion of the active device region, the thin film encapsulant comprising: a first layer, the first layer disposed immediately adjacent the active device region and comprising a soft and pliable material; and a second layer disposed on the first layer, the second layer comprising a rigid dielectric material or rigid metal material.



**A. CLASSIFICATION OF SUBJECT MATTER**

**H01M 10/04(2006.01)i, H01M 10/0585(2010.01)i, H01M 2/02(2006.01)i, H01M 2/10(2006.01)i, H01M 4/131(2010.01)i, H01M 10/0562(2010.01)i**

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)

H01M 10/04; H01M 2/08; C23C 14/34; H01M 6/40; H01M 4/02; H01B 1/00; H01M 4/04; H01M 10/0585; H01M 2/02; H01M 2/10; H01M 4/131; H01M 10/0562

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models  
Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & keywords: thin film battery, encapsulation layer, lithiation, thickness, volume, expansion, contraction, lithium, internal stress

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2008-0003493 A1 (BATES, JOHN B.) 03 January 2008 See paragraphs [0021]-[0023], [0026], [0043]-[0051]; claims 1, 8, 9, 13-15, 17, 19, 20; and figures 1, 4, 5.	1-13, 15
Y		14
Y	US 2015-0325862 A1 (APPLIED MATERIALS, INC.) 12 November 2015 See paragraphs [0032], [0034], [0043]; and figures 3A-3F, 4A-4D.	14
A	US 2009-0181303 A1 (NEUDECKER, BERND J. et al.) 16 July 2009 See paragraphs [0010], [0011], [0016], [0017], [0020], [0024]; claims 1-6, 8-12, 16, 20, 21, 32; and figure 1.	1-15
A	US 2012-0321815 A1 (SONG, DAOYING et al.) 20 December 2012 See paragraphs [0021]-[0023], [0028]; claim 1; and figures 3A-3H.	1-15
A	US 2011-0097625 A1 (BEDJAQUI, MESSAOUD et al.) 28 April 2011 See the whole document.	1-15

Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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

"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search

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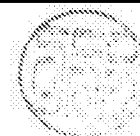
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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2017/027561**

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