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- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
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[Continued on next page]

- (54) Title: PATTERNED SUBSTRATES WITH DARKENED MULTILAYERED CONDUCTOR TRACES

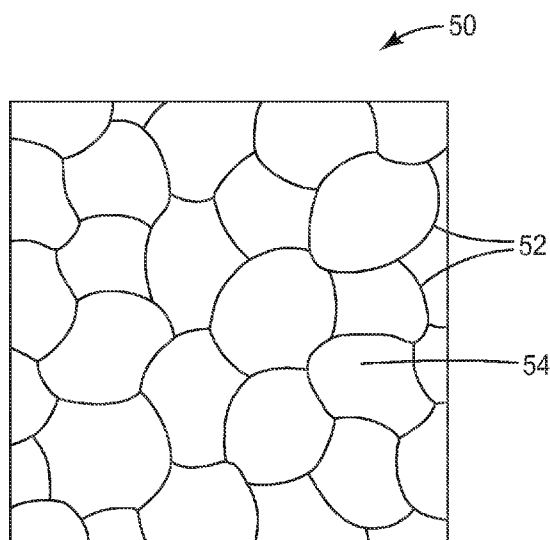


FIG. 5

(57) Abstract: The present disclosure provides an article having a substrate having opposing first and second surfaces. A conductor micropattern disposed on the first surface of the substrate. The conductor micropattern has a plurality of traces defining a plurality of cells. The conductor micropattern has an open area fraction greater than 80% and a uniform distribution of trace orientation. Each of the traces has a trace width from 0.5 to 10 micrometer. The conductor micropattern is a tri-layer material comprising in sequence a semi-reflective metal, a transparent layer, and a reflective layer disposed on the transparent layer. The articles are useful in devices such as displays, in particular, touch screen displays useful for mobile hand held devices, tablets and computers. They also find use in antennas and for EMI shields.

**Declarations under Rule 4.17:**

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(88) Date of publication of the international search report:

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/023480**A. CLASSIFICATION OF SUBJECT MATTER****H05K 9/00(2006.01)i, B32B 3/12(2006.01)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)

H05K 9/00; G02B 5/20; G06F 3/045

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: touch, pattern, conduct

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2010-0156840 A1 (FREY MATTHEW H. et al.) 24 June 2010 See abstract, paragraphs [0005],[0053],[0110]-[0119], claims 1,11,19,20 and figures 16-18.	1-15
Y	KR 10-2010-0080368 A (SAMSUNG SDI CO., LTD.) 08 July 2010 See abstract, paragraphs [0031]-[0035], figures 2, 3d.	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

"E" earlier application or patent but published on or after the international filing date

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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

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"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

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

03 AUGUST 2012 (03.08.2012)

Date of mailing of the international search report

07 AUGUST 2012 (07.08.2012)

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010-0156840 A1	24.06.2010	CN 102016766 A	13.04.2011
		CN 102016767 A	13.04.2011
		CN 102016768 A	13.04.2011
		CN 102017071 A	13.04.2011
		CN 102334091 A	25.01.2012
		EP 2257969 A2	08.12.2010
		EP 2260366 A2	15.12.2010
		EP 2260367 A2	15.12.2010
		EP 2263141 A2	22.12.2010
		JP 2011-513846 A	28.04.2011
		JP 2011-514597 A	06.05.2011
		JP 2011-514597 T	06.05.2011
		JP 2011-517355 A	02.06.2011
		JP 2011-517367 A	02.06.2011
		KR 10-2010-0137483 A	30.12.2010
		KR 10-2010-0138964 A	31.12.2010
		KR 10-2011-0127236 A	24.11.2011
		TW 200943149 A	16.10.2009
		TW 200945146 A	01.11.2009
		TW 200945445 A	01.11.2009
		TW 201001264 A	01.01.2010
		US 2009-0218310 A1	03.09.2009
		US 2009-0219257 A1	03.09.2009
		US 2009-0219258 A1	03.09.2009
		US 8179381 B2	15.05.2012
		WO 2009-108758 A2	03.09.2009
		WO 2009-108758 A3	03.09.2009
		WO 2009-108765 A2	03.09.2009
		WO 2009-108765 A3	03.09.2009
		WO 2009-108765 A3	19.11.2009
		WO 2009-108771 A2	03.09.2009
		WO 2009-108771 A3	03.09.2009
		WO 2009-154812 A2	23.12.2009
		WO 2009-154812 A3	23.12.2009
		WO 2010-099132 A2	02.09.2010
		WO 2010-099132 A3	02.09.2010
KR 10-2010-0080368 A	08.07.2010	CN 101770049 A	07.07.2010
		EP 2204676 A1	07.07.2010
		US 2010-0165469 A1	01.07.2010