

(51) International Patent Classification:
H01L 51/52 (2006.01)(21) International Application Number:
PCT/US2012/051548(22) International Filing Date:
20 August 2012 (20.08.2012)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
13/218,610 26 August 2011 (26.08.2011) US(71) Applicant (for all designated States except US): **3M INNOVATIVE PROPERTIES COMPANY** [US/US]; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US).(72) Inventors: **JONES, Vivian W.**; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US). **LAMANSKY, Sergey**; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US). **NELSON, James M.**; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US). **LE, Ha T.**; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US).(74) Agents: **VIETZKE, Lance L.** et al.; 3M Center Office of Intellectual Property Counsel, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US).

(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, BN, 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.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

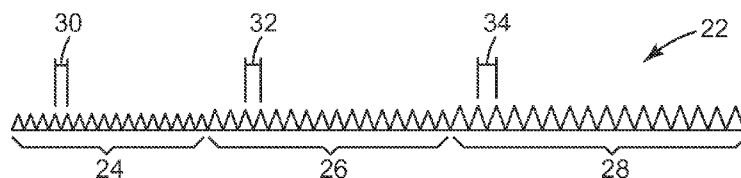
Declarations under Rule 4.17:

- 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))

Published:

- with international search report (Art. 21(3))
- 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))

(54) Title: OLED LIGHT EXTRACTION FILM WITH MULTI-PERIODIC ZONES OF NANOSTRUCTURES

**Fig. 2A**

(57) **Abstract:** A light extraction film having multi-periodic zones of engineered nanostructures. The light extraction film includes a flexible substrate, a layer of low index engineered nanostructures applied to the substrate, and a high index backfill layer applied over the nanostructures. The multi-periodic zones include a repeating zone of the nanostructures having multi-periodic characteristics. The repeating zone includes first and second sets of nanostructures having different periodic pitches. The multi-periodic zones can be used to enhance the light output and tune the angular luminosity of organic light emitting diode devices.

