

(43) International Publication Date
11 September 2009 (11.09.2009)

PCT

(10) International Publication Number
WO 2009/111385 A3

(51) International Patent Classification:

D01D 5/30 (2006.01) **B42D 15/10** (2006.01)
D01D 5/34 (2006.01)

(21) International Application Number:

PCT/US2009/035685

(22) International Filing Date:

2 March 2009 (02.03.2009)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/034,007 5 March 2008 (05.03.2008) US
61/092,165 27 August 2008 (27.08.2008) 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; and

(75) Inventors/Applicants (for US only): **BLUEM, Gregory, L.** [US/US]; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US). **FRANKEL, Joan, M.** [US/US]; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US). **KRAMLICH, David, C.** [US/CH]; Alte Landstrasse 81, Küsnacht, CH-8700 Zurich (CH). **BROTT, Robert, L.** [US/US]; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US). **HART, Shandon, D.** [US/US]; 4005 Pine Hil Road, Corning, New York 14830 (US). **LORIMOR, Lynn, E.** [US/US]; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US). **FLEMING, Patrick, R.** [US/US]; 3M Center, Post Office Box33427, Saint Paul, Minnesota 55133-3427 (US). **KOPECKY, William, J.** [US/US]; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US). **WILSON, Bruce, B.** [US/US]; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US). **JONZA, James, M.** [US/US]; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US). **ZILLIG, Daniel, J.** [US/US]; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US). **MITCHELL, James, G.** [US/US]; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US).(74) Agents: **OLOFSON, Jeffrey, M.** et al.; 3M Center, Office of Intellectual Property Counsel, 3M Center, 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, BR, BW, BY, BZ, CA, CH, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, 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, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (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, SE, SI, SK, TR),

[Continued on next page]

(54) Title: COLOR SHIFTING MULTILAYER POLYMER FIBERS AND SECURITY ARTICLES CONTAINING COLOR SHIFTING MULTILAYER POLYMER FIBERS

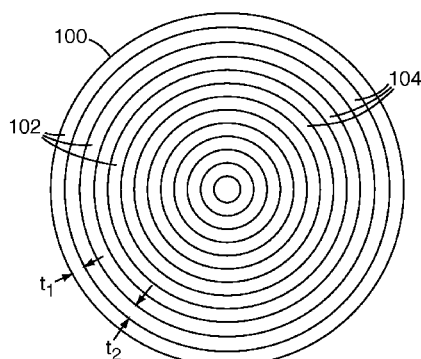


Fig. 1B

(57) Abstract: Polymer fibers are formed with concentric alternating layers of different polymer materials. The layers pairs have cross-sectional thicknesses selected for reflecting light at a selected visible wavelength. A cross-sectional dimension of the core is at least ten times an average of the selected thicknesses of the alternating layers. Some articles formed by the fibers are formed by attaching one fiber to another: the color of the fibers at the point of attachment is different from the colors of the fibers elsewhere. The fibers may be deformed to change its color properties by elongating the cross-section of the polymer fiber along a first cross-sectional axis. In some embodiments, the fibers are polarization sensitive.



OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:**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))*

- *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))*

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

3 December 2009