(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
6 December 2007 (06.12.2007)

PCT

(10) International Publication Number
WO 2007/140190 A1

(51) International Patent Classification:
H01L 21/301 (2006.01) *H01L 21/268* (2006.01)

(21) International Application Number:
PCT/US2007/069483

(22) International Filing Date: 22 May 2007 (22.05.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
11/440,711 24 May 2006 (24.05.2006) US

(71) Applicant *(for all designated States except US)*: **ELECTRO SCIENTIFIC INDUSTRIES, INC.** [US/US]; 13900 NW Science Park Drive, Portland, OR 97229-5491 (US).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **BAIRD, Brian, W.** [US/US]; 18250 S. Clark Lane, Oregon City, OR 97045 (US).

(74) Agent: **LEVINE, Michael, L.**; Stoel Rives, LLP, 900 SW Fifth Avenue, Suite 2600, Portland, OR 97204 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, 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, 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, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) **Title:** LASER PROCESSING OF WORKPIECES CONTAINING LOW-K DIELECTRIC MATERIAL

Wavelength (nm)	Optical Constants (n,k)	
	SRO	SiCHO
248	1.90, 0.312	1.48, 0.004
266	1.91, 0.244	1.48, 0.004
355	1.86, 0.088	1.44, 0.003
365	1.85, 0.079	1.44, 0.002
532	1.78, 0.016	1.42, 0
633	1.76, 0.008	1.42, 0
1047	1.72, 0	1.41, 0
1340	1.72, 0	1.41, 0

(57) **Abstract:** Laser output including at least one laser pulse (32) having a wavelength greater than 1.1 μm and shorter than 5 μm (preferably at about 1.1 μm) and having a pulsewidth shorter than 100 ps (preferably shorter than 10 ps) permits low -k dielectric material, such as SRO or SiCOH, to be removed without damaging the substrate. An oscillator module (12) in cooperation with an amplification module (16) are used to generate the laser output.

WO 2007/140190 A1