



(51) International Patent Classification:
H01L 21/50 (2006.01)

(21) International Application Number:
PCT/US2012/033147

(22) International Filing Date:
11 April 2012 (11.04.2012)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/473,988 11 April 2011 (11.04.2011) US

(71) Applicant (for all designated States except US): **NDSU RESEARCH FOUNDATION** [US/US]; 1735 NDSU Research Park Drive, Dept. No. 4400, P.O. Box 6050, Fargo, North Dakota 58108-6050 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **MARINOV, Val** [US/US]; 111 28th Ave. N., Fargo, North Dakota 58102 (US). **SWENSON, Orven** [US/US]; 2641 26th Ave. S., Fargo, North Dakota 58103 (US). **PAVICIC, Mark** [US/US]; 718 South Drive S., Fargo, North Dakota 58103 (US). **MILLER, Ross** [US/US]; 1164 39th Ave. S., Moorhead, Minnesota 56560 (US). **CHEN, Zhigang** [CN/US]; 1928 50th St. S., Fargo, North Dakota 58103 (US). **SARWAR, Ferdous** [BD/US]; 64 University Village, Fargo, North Dakota 58102 (US). **SEMLER, Matthew** [US/US]; 2950 60th St. SW, Appleton, Minnesota 56208 (US).

(74) Agent: **O'BANION, John**; O'BANION & RITCHEY LLP, 400 Capitol Mall, Suite 1550, Sacramento, California 95814 (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, 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, MD, 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).

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))

(88) Date of publication of the international search report:
28 February 2013

(54) Title: SELECTIVE LASER-ASSISTED TRANSFER OF DISCRETE COMPONENTS

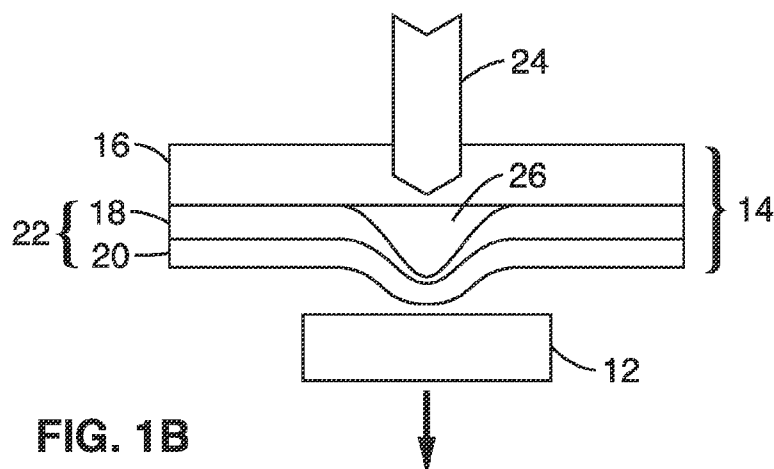


FIG. 1B

(57) Abstract: Electronic components are often assembled using robotic equipment, such as pick-and-place machines, that is not optimized for components such as ultra-thin semiconductor bare dice. Selective laser-assisted die transfer is described based on the unique blistering behavior of a multilayer dynamic release layer when irradiated by low energy focused laser pulse(s) in which the blister creates translation of the article being placed. Accurate placement results are provided with negligible lateral and angular displacement.



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/033147**A. CLASSIFICATION OF SUBJECT MATTER*****H01L 21/50(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)

H01L 21/50; H01L 21/56; B29C 65/78; B44C 1/00; G03F 7/20; H01L 23/58; H01L 21/44; H01L 21/48

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: die, carrier, laser, blister, laser-transparent and adhesion

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2010-0072594 A1 (KERR ROGER S. et al.) 25 March 2010 See the abstract, figures 2-3, pages 3-4 and claims 1, 10.	1-30
A	US 6204092 B1 (FREUND; JOSEPH M. et al.) 20 March 2001 See the abstract, figures 2-4 columns 3-4 and claim 1.	1-30
A	KR 10-0374469 B1 (PRESSTEK, INC.) 04 March 2003 See the abstract, figures 2a-2c page 4 and claim 1.	1-30
A	US 2008-0210368 A1 (ZAKEL ELKE et al.) 04 September 2008 See the abstract, figures 3-4 page 3 and claim 1.	1-30



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

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"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

12 DECEMBER 2012 (12.12.2012)

Date of mailing of the international search report

14 DECEMBER 2012 (14.12.2012)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan
City, 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

Kim, Sang-Taek

Telephone No. 82-42-481-8623



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/033147

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010-0072594 A1	25.03.2010	US 2011-0068452 A1 US 7879691 B2 WO 2010-036327 A2	24.03.2011 01.02.2011 01.04.2010
US 6204092 B1	20.03.2001	None	
KR 10-0374469 B1	04.03.2003	AU 2000-10161 A1 AU 2000-10161 B2 CA 2292472 A1 CA 2292472 C CN 1264851 A0 CN 1279402 C0 EP 1022133 A1 EP 1022133 B1 JP 2000-211097 A JP 3370965 B2 TW 496830 A TW 496830 B US 6168903 B1	03.08.2000 02.05.2002 21.07.2000 17.02.2004 30.08.2000 11.10.2006 26.07.2000 20.07.2005 02.08.2000 27.01.2003 01.08.2002 01.08.2002 02.01.2001
US 2008-0210368 A1	04.09.2008	CN 101164150 A0 CN 101164150 B DE 112006001493 A5 EP 1869701 A2 JP 2008-535275 A JP 2008-535275 T KR 10-2007-0120583 A WO 2006-105782 A2 WO 2006-105782 A3	16.04.2008 18.08.2010 20.03.2008 26.12.2007 28.08.2008 28.08.2008 24.12.2007 12.10.2006 12.10.2006