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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
11 November 2004 (11.11.2004)

PCT

(10) International Publication Number
WO 2004/097937 A1

(51) International Patent Classification[7]: H01L 23/48, 23/52, 29/40

(21) International Application Number:
PCT/US2003/037952

(22) International Filing Date:
25 November 2003 (25.11.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10/249,621 24 April 2003 (24.04.2003) US

(71) Applicant: **INTERNATIONAL BUSINESS MACHINES CORPORATION** [US/US]; New Orchard Road, Armonk, NJ 10504 (US).

(72) Inventors: **FAROOQ, Mukta, G.**; 6 Dartantra Drive, Hopewell Junction, NY 12533 (US). **INTERRANTE, Mario, J.**; 11 Meadow Road, New Paltz, NY 12561 (US).

(74) Agent: **CIOFFI, James, J.**; International Business Machines Corporation, Zip 482, 2070 Route 52, Hopewell Junction, NY 12533 (US).

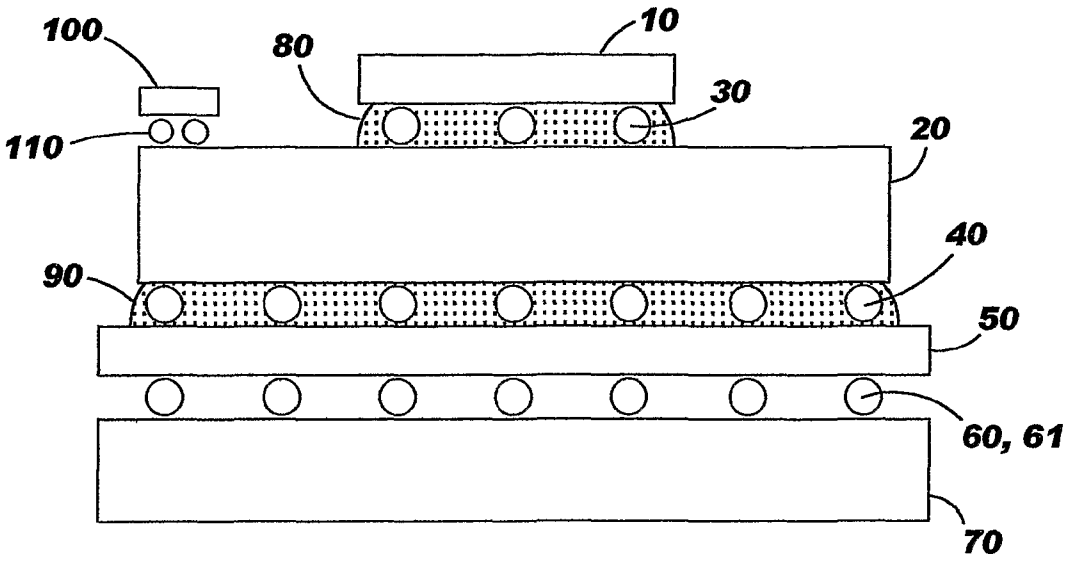
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(regional)*: ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

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: LEAD FREE ALLOYS FOR COLUMN/BALL GRID ARRAYS, ORGANIC INTERPOSERS AND PASSIVE COMPONENT ASSEMBLY



(57) Abstract: A lead free solder hierachy structure for electronic packaging that includes organic interposers (50). The assembly may also contain passive components (100) as well as underfill material (80). The lead free solder hierachy also provides a lead free solder solution for the attachment of a heat sink (75) to the circuit chip (10) with a suitable lead free solder alloy.e assembly may also

WO 2004/097937 A1