(54) Title: SYSTEM AND METHOD FOR INCREASED STAND-OFF HEIGHT IN STUD BUMPING PROCESS

(57) Abstract: System and method for creating single stud bumps having an increased stand-off height. A preferred embodiment comprises a capillary (100) for use in creating stud bumps in a flip chip assembly, comprising a hole section (11) adapted to pass a wire, a chamfer section (12) providing a transition from the hole section to a stud bump section (13), and a sidewall (107) within the stud bump section, the sidewall having a side-wall height, wherein the side wall height is equal to, or greater than, the diameter of the stud bump section.

FIG. 1
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))
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

**IPC(8) -** H01L 23/488; H01L 21/60 (2009.01)

**USPC -** 257/737; 228/4.5; 257/778, 438/617

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)**

USPC - 257/737; 228/4.5; 257/778, 438/617

**Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched**

USPC - 257/737; 228/4.5; 257/778, 438/617 (keyword limited—see terms below)

**Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)**

PubWEST (PQDB, USPT, EPAJ, JPAB); Google Scholar

**Search Terms Used:** flip, chip, stud, bumps, capillary, hole, tapered, sidewalk or side wall, bump diameter, overcoat, protective, copper or gold, bond pad, substrate, height, solder

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>US 2006/0228825 A1 (HEMBREE) 12 October 2006 (12:10:2006), para [0052], [0084], [0092], Fig. 1A</td>
<td>1-13</td>
</tr>
<tr>
<td>Y</td>
<td>US 6,441,475 B2 (ZANDMAN et al.) 27 August 2002 (27:08:2002), col 7, In 4-10</td>
<td>8</td>
</tr>
</tbody>
</table>

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
  * "A" document defining the general state of the art which is not considered to be of particular relevance
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**Date of the actual completion of the international search**

16 December 2009 (16:12:2009)

**Date of mailing of the international search report**

29 DEC 2009

**Name and mailing address of the ISA/US**

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450

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