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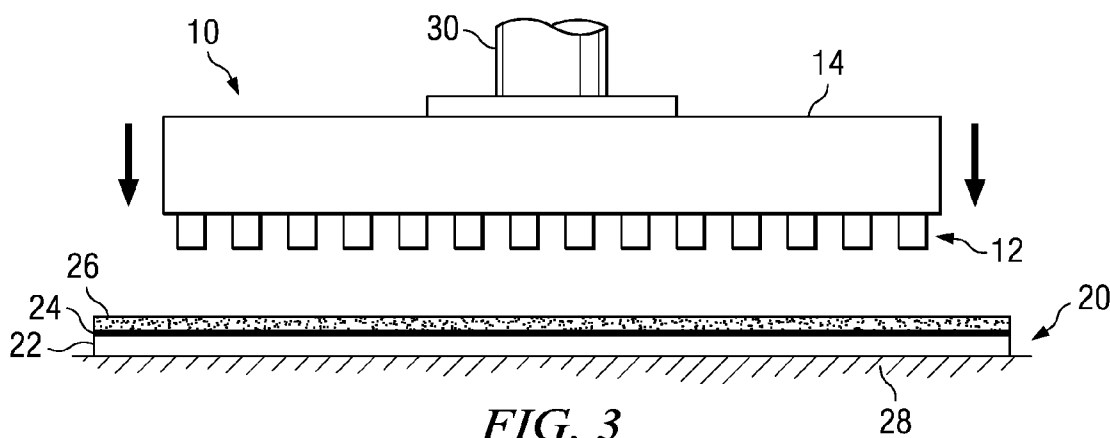
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[Continued on next page]

(54) Title: SOLDER CAP APPLICATION PROCESS ON COPPER BUMP USING SOLDER POWDER FILM



(57) Abstract: A method used during the formation of a semiconductor device assembly can include contacting an end of a conductive bump (12) (which can be a pillar, ball, pad, post, stud, or lead as well as other types of bumps) with a conductive powder such as a solder powder (26) to adhere the conductive powder to the end of the bump. The powder can be flowed, for example by heating, to distribute it across the end of the bump. The flowed powder can be placed in contact with a conductive pad of a receiving substrate and can then be reflowed to facilitate electrical connection between the bump and the conductive pad.



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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2008/069697**A. CLASSIFICATION OF SUBJECT MATTER*****H01L 21/60(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)

IPC B23K 1/00, H01L 21/60, H05K1/00

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 SINCE 1975
JAPANESE UTILITY MODELS AND APPLICATIONS FOR UTILITY MODELS SINCE 1975Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKIPASS(KIPO internal) & keyword : bump, adhesive, and powder**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 04-127548 A (FUJITSU LTD.) 28 April 1992 See the whole document	1-15
X	JP 08-064637 A (ROHM CO., LTD.) 8 March 1996 See the whole document	1-15
A	JP 2006-134982 A (MATSUSHITA ELECTRIC IND CO., LTD.) 25 May 2006 See the abstract; Paragraph [0011]~[0031]; and Figs. 1-2	1-15
A	US 5,192,835 A (DAVID N. BULL) 9 March 1993 See the abstract; column 3, line 3 - column 4, line 59; and Figs. 1-2	1-15

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

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"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

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 04-127548 A	28.04.1992	None	
JP 08-064637 A	08.03.1996	None	
JP 2006-134982 A	25.05.2006	CN 1910974 A EP 1808265 A1 KR 10-2007-0043691 A WO 2006-049069 A1	07.02.2007 18.07.2007 25.04.2007 11.05.2006
US 5192835 A	09.03.1993	EP 0558589 A1 WO 92-06491 A1	08.09.1993 16.04.1992