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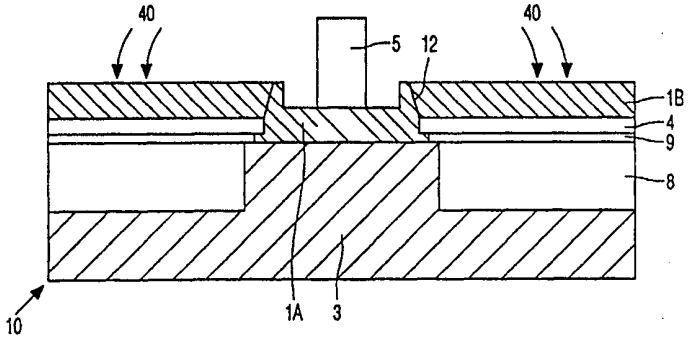

(57) Abstract

The invention relates to a method of manufacturing a discrete or integrated bipolar transistor comprising a base (1A), an emitter (2) and a collector (3). The base (1A) and a connecting region (1B) of the base (1A) are formed by providing a semiconductor body (10) with a doped semiconducting layer (1) which locally borders on a monocrystalline part (3) of the semiconductor body which forms the collector (3). Outside said base, the layer (1) borders on a non-monocrystalline part (4) of the semiconductor body (10) and forms a non-monocrystalline connecting region (1B) of the base (1A). By means of a mask (5), the doping concentration of the layer (1) outside the mask (5) is selectively increased, resulting in a highly conducting connection region (1B) and a very fast transistor. In the known method, an ion implantation is used for this purpose. In a method in accordance with the invention, this is achieved by bringing the semiconductor body (10) into contact with a gaseous substance (40) comprising a doping element, and heating the semiconductor body (10) in such a manner that the doping elements penetrate into the semiconducting layer (1). The supply of the gaseous substance (40), for example diborane, preferably takes place at a temperature between 800 and 950 °C for one to several minutes. Subsequently, a slightly longer diffusion step can be carried out, for example, at 850 °C.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H01L21/331 H01L29/732 H01L29/737

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 7 H01L

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 3 600 651 A (DUNCAN DAVID M) 17 August 1971 (1971-08-17) column 2, line 70 -column 3, line 7 column 3, line 43 - line 58; figure 4	1,2,5,6, 10 3,4,7-9
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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
23 February 2000	02/03/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Gélébart, J

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INTERNATIONAL SEARCH REPORT

Int onal Application No
PCT/EP 99/05600

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
Y	YUKIHIRO KIYOTA ET AL: "ULTRA-THIN-BASE SI BIPOLAR TRANSISTOR USING RAPID VAPOR-PHASE DIRECT DOPING (RVD)" IEEE TRANSACTIONS ON ELECTRON DEVICES,US,IEEE INC. NEW YORK, vol. 39, no. 9, 1 September 1992 (1992-09-01), pages 2077-2081, XP000293951 ISSN: 0018-9383 page 2078, left-hand column	9
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