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(71) Applicant: EPIWORKS, INC. [US/US]; 1606 Rion Drive, Champaign, IL 61822 (US).

(72) Inventor: HARTMANN, Quesnell; 4003 Danbury Drive, Champaign, IL 61822 (US).

(74) Agents: PATEL, Binal, J. et al.; Banner & Witcoff, Ltd., 10 S. Wacker Drive, Chicago, IL 60606-7407 (US).

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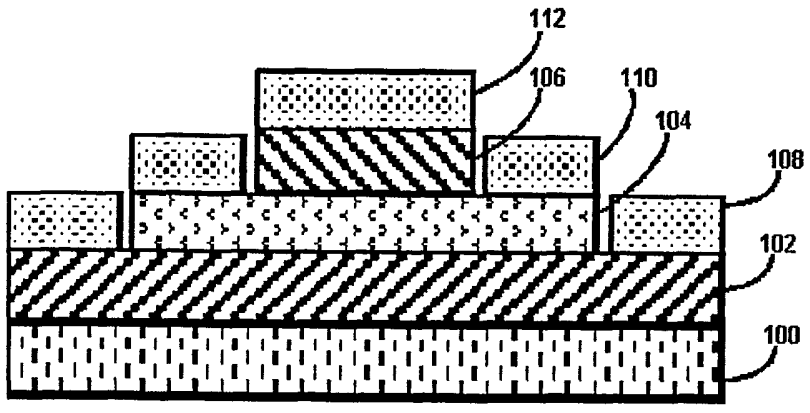
(54) Title: TRANSISTOR WITH INTENTIONALLY TENSILE MISMATCHED BASE LAYER



(57) Abstract: A transistor having a substrate (100) formed of indium phosphide (InP), and having emitter (106), base (104) and collector (102) layers formed over the substrate (100) such that the base layer (104) is disposed between the emitter and collector layers (106, 102). The collector layer (102) formed from InGaAs, and the collector layer (102) being doped n-type. The emitter layer (106) formed from InP, and the emitter layer (106) being doped n-type. The base layer (104) formed of indium gallium arsenide (InGaAs), the base layer (104) being tensile mismatched, and doped p-type. A lattice mismatch between the substrate (100) and the base (104) material is greater than 0.2%. In an x-ray rocking curve of the heterojunction bipolar transistor, a peak corresponding to the base layer (104) is separated from a peak corresponding to the substrate layer (100) by at least 250 arcseconds. In one embodiment this results from the percentage of indium in the base layer (104) is less than 51.5%, that is the lattice constant of the base layer (104) is substantially smaller than a lattice constant of the substrate throughout an entire base region.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H01L29/737 H01L29/205 H01L29/10

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)
EPO-Internal, INSPEC, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 614 423 A (MATSUOKA ET AL.) 25 March 1997 (1997-03-25) column 6, line 41 -column 7, line 59; figure 2	1-30
A	EP 0 977 250 A (DAIMLER CHRYSLER AG) 2 February 2000 (2000-02-02) column 2, line 55 -column 3, line 22	1-30
A	EP 0 571 994 A (HUGHES AIRCRAFT CO) 1 December 1993 (1993-12-01) column 5, line 32 -column 6, line 30; figure 4	1-30

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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
5 December 2002	18/12/2002

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	Baillet, B

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	MAIGNE P ET AL: "MEASUREMENT OF THE EXTENT OF STRAIN RELIEF IN INGAAS LAYERS GROWN UNDER TENSILE STRAIN ON INP(100) SUBSTRATES" APPLIED PHYSICS LETTERS, AMERICAN INSTITUTE OF PHYSICS. NEW YORK, US, vol. 69, no. 5, 29 July 1996 (1996-07-29), pages 682-684, XP000626071 ISSN: 0003-6951 ---	
A	MORISHITA Y ET AL: "Real-time scanning microprobe reflection high-energy electron diffraction observations of InGaAs surfaces during molecular-beam epitaxy on InP substrates" 21ST ANNUAL CONFERENCE ON THE PHYSICS AND CHEMISTRY OF SEMICONDUCTOR INTERFACES (PCSI-21), NEW PLATZ, NY, USA, 25-30 JAN. 1994, vol. 12, no. 4, pages 2532-2540, XP002223669 Journal of Vacuum Science & Technology B (Microelectronics and Nanometer Structures), July-Aug. 1994, USA ISSN: 0734-211X -----	

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Information on patent family members

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