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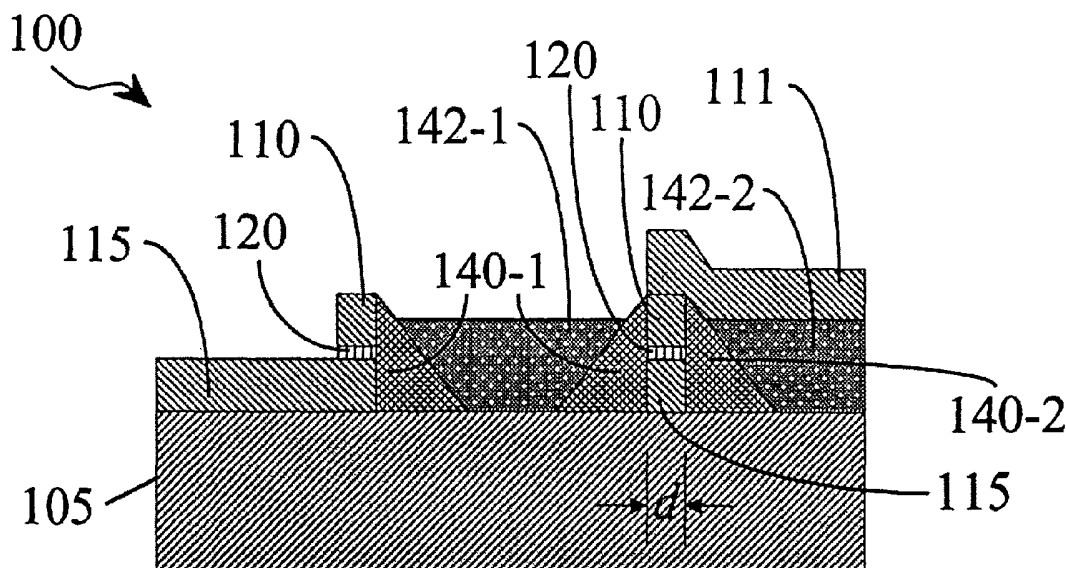
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39/22 Box 20, Suite 4200, Toronto-Dominion Centre, Toronto
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(54) Title: SUBMICRON CLOSED-FORM JOSEPHSON JUNCTIONS



(57) Abstract: A method for fabricating a closed-form Josephson junction includes etching the inner shape of the closed-form junction on the chip, depositing a negative photoresist material over the etched chip, and flood exposing the backside of the chip with ultraviolet radiation. The photoresist is developed and then baked onto the chip. The baked photoresist serves as a mask for subsequent etching of the exterior of the closed-form Josephson junction. A shaped Josephson junction is fabricated with junction widths between about 0.1 μm and about 1 μm and an inner diameter ranging between about 1 μm and about 1000 μm .



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.

INTERNATIONAL SEARCH REPORT

 International Application No
 PCT/CA 02/01328

 A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 H01L39/24 H01L39/22

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 G01R

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	LISITSKII M P ET AL: "Annular Josephson junctions for radiation detection: fabrication and investigation of the magnetic behaviour" NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH, SECTION - A: ACCELERATORS, SPECTROMETERS, DETECTORS AND ASSOCIATED EQUIPMENT, NORTH-HOLLAND PUBLISHING COMPANY, AMSTERDAM, NL, vol. 444, no. 1-2, April 2000 (2000-04), pages 476-479, XP004196459 ISSN: 0168-9002 page 2, left-hand column, paragraph 2	1-26, 36, 37
A	EP 0 476 844 A (TRW INC) 25 March 1992 (1992-03-25) the whole document --- -/--	1-26, 36, 37

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"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

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8 August 2003

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 02/01328

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,A	POTTS A ET AL: "CMOS compatible fabrication methods for submicron Josephson junction qubits" IEE PROCEEDINGS: SCIENCE, MEASUREMENT AND TECHNOLOGY, IEE, STEVENAGE, HERTS, GB, vol. 148, no. 5, 5 September 2001 (2001-09-05), pages 225-228, XP006017317 ISSN: 1350-2344 page 226, left-hand column, paragraph 2.FABRICATION -page 227, left-hand column ---	1-26,36, 37
P,A	HADFIELD R H ET AL: "Novel Josephson junction geometries in NbCu bilayers fabricated by focused ion beam microscope" PHYSICA C, NORTH-HOLLAND PUBLISHING, AMSTERDAM, NL, vol. 367, no. 1-4, 15 February 2002 (2002-02-15), pages 267-271, XP004332041 ISSN: 0921-4534 page 268, left-hand column, paragraph 2.FABRICATION -page 269, left-hand column -----	1-26,36, 37

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA 02/01328

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-26, 36, 37

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International Application No. PCT/CA 02/01328

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-26,36,37

A method of fabricating and insulating a closed-form Josephson junction in a trilayer chip comprising the step of back-irradiating said trilayer chip, and a supercomputing structure comprising the thus fabricated closed-form Josephson junction.

2. Claims: 27-35

A method for attaching an electrode to a closed-form Josephson junction

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/CA 02/01328

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0476844 A	25-03-1992	EP 0476844 A1	25-03-1992
		JP 5145132 A	11-06-1993
