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- (81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM,

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(54) Title: METHOD FOR FABRICATING SUPERCONDUCTING DEVICES USING A FOCUSED ION BEAM

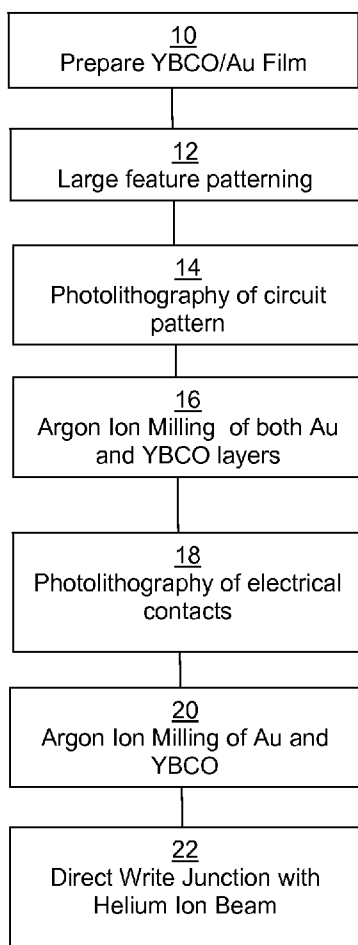


FIG. 1

(57) Abstract: Nano-scale junctions, wires, and junction arrays are created by using a focused high-energy ion beam to direct-write insulating or poorly conducting barriers into thin films of materials that are sensitive to disorder, including superconductors, ferromagnetic materials and semiconductors.



AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 15/35426

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - H01L 39/22, H01L 39/24 (2015.01)

CPC - H01L 39/22, H01L 39/2467, H01L 39/2493, H01L 39/2496

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(8)- H01L39/22, H01L39/24 (2015.01)

CPC - H01L39/22, H01L39/2467, H01L39/2493, H01L39/2496

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

IPC(8)- H01L39/22, H01L39/24 (2015.01)

CPC - H01L39/22, H01L39/2467, H01L39/2493, H01L39/2496; USPC - 216/3; 505/329,832,922

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

PatBase, Proquest Dialog, Google Patents, Google Scholar,

Search terms used: FIB, focused ion beam, superconductor, manufacture, fabrication, process, film, layer, thickness, bridge, junction, Josephson, uniform, beam, diameter, width, lateral, straggle, nanowire, tunnel, substrate, support, negative bias

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X — Y	BODEA et al., "Modification and nano-patterning of high-Tc superconducting thin films by masked ion beam radiation." 9th European Conference on Applied Superconductivity (EUCAS 09) IOP Publishing. Journal of Physics: Conference Series 234 (2010), [online] [retrieved on 2015-11-23] <URL:http://iopscience.iop.org/article/10.1088/1742-6596/234/1/012005/pdf>	32-35, 40, 41, 44 1-31, 36-39, 42, 43, 45
Y	US 5,411,937 A (WENDT et al.) 02 May 1995 (02.05.1995), Fig 1-5, 9, abstract, col 4, ln 45-60, col 5, ln 10-50, col 7, ln 17-col 8, ln 35	1-31
Y	US 2012/0199737 A1 (MAAS et al.) 09 August 2012 (09.08.2012), Fig 9, abstract, para [0093], [0095]-[0096]	36, 38
Y	US 2011/0147609 A1 (SHICHI et al.) 23 June 2011 (23.06.2011), abstract, para [0340]	6, 15, 27, 37
Y	US 5,416,072 A (INADA et al.) 16 May 1995 (16.05.1995), Fig 1F, abstract, col 7, ln 1-18	8, 9, 23, 39
Y	US 5,801,393 A (SUNG et al.) 01 September 1998 (01.09.1998), abstract, col 1, ln 28-45	42, 43
Y	US 2010/0230814 A1 (MARKS et al.) 16 September 2010 (16.09.2010), abstract; para [0043], [0079]	45
Y	US 6,924,493 B1 (LEUNG) 02 August 2005 (02.08.2005), abstract, col 8, ln 11-31	3, 7, 15, 22, 30
Y	US 5,109,164 A (MATSUI et al.) 28 April 1992 (28.04.1992), abstract, col 8, ln 6-21	31

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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

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