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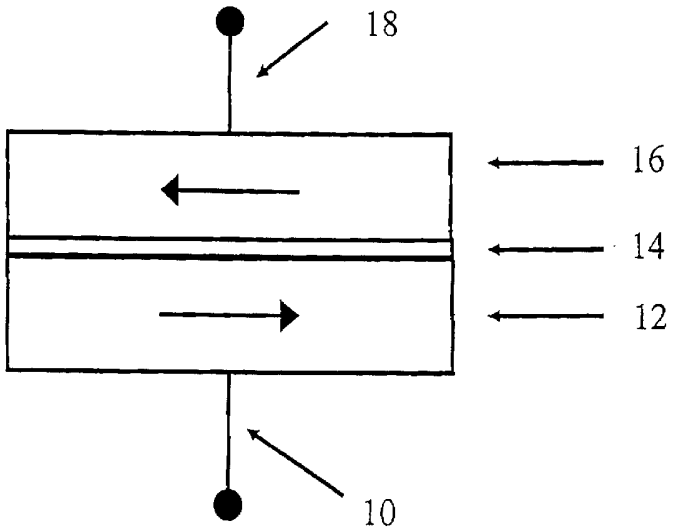
[Continued on next page]

(54) Title: THIN FILMS FOR MAGNETIC DEVICES



(57) Abstract: Methods are provided for forming uniformly thin layers in magnetic devices. Atomic layer deposition (ALD) can produce layers that are uniformly thick on an atomic scale. Magnetic tunnel junction dielectrics, for example, can be provided with perfect uniformity in thickness of 4 monolayers or less. Furthermore, conductive layers, including magnetic 12, 16 and non-magnetic layers 14, can be provided by ALD without spiking and other non-uniformity problems. The disclosed methods include forming metal oxide layers by multiple cycles of ALD and subsequently reducing the oxides to metal. The oxides tend to maintain more stable interfaces during formation.

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INTERNATIONAL SEARCH REPORT

International Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H01L43/12 H01F10/32 H01F41/30

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 C30B H01L H01F

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, WPI Data, INSPEC, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
O,X	DATABASE INSPEC 'Online! THE INSTITUTION OF ELECTRICAL ENGINEERS, STEVENAGE, GB; "5th Asian Symposium on Information Storage Technology (ASIST), Hong Kong, China, 14-16 November 2000, Vol. E84-C, no 9, IEICE Transactions on Electronics, Sept. 2001, Inst. Electron. Inf. & Commun. Eng, Japan. ISSN: 0916-8524" Database accession no. 7054226 XP002223616 abstract & CHANG-WOOK JEONG (SEOUL NATIONAL UNIVERSITY CENTER FOR ADVANCED MATERIALS RES.): "Thursday, 16-11-2000: Magnetoresistance of ferromagnetic tunneljunctions with Al2O2 formed by Plasma-Assisted Atomic Layer Controlled Deposition"" -/--	1-6,9

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
7 January 2003	22/01/2003

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	Visscher, E

Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
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X	UTRIAINEN M ET AL: "Studies of metallic thin film growth in an atomic layer epitaxy reactor using M(acac)/sub 2/ (M=Ni,Cu,Pt) precursors" APPLIED SURFACE SCIENCE, APRIL 2000, ELSEVIER, NETHERLANDS, vol. 157, no. 3, pages 151-158, XP002223297 ISSN: 0169-4332 Section 1: Introduction	33-35, 39-41
X	PATENT ABSTRACTS OF JAPAN vol. 012, no. 085 (E-591), 17 March 1988 (1988-03-17) -& JP 62 221102 A (HITACHI LTD), 29 September 1987 (1987-09-29) abstract	33,39-41
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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