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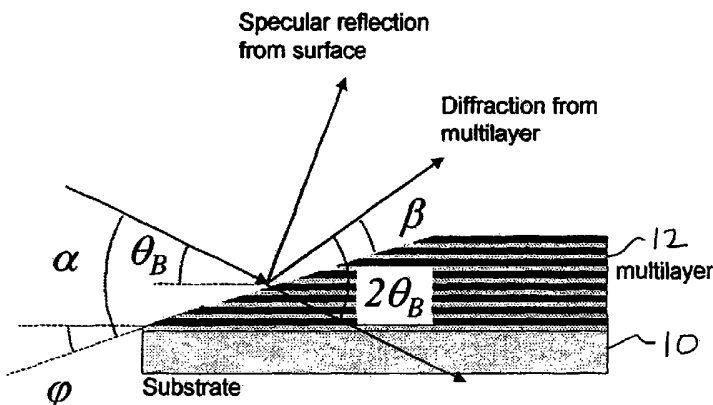
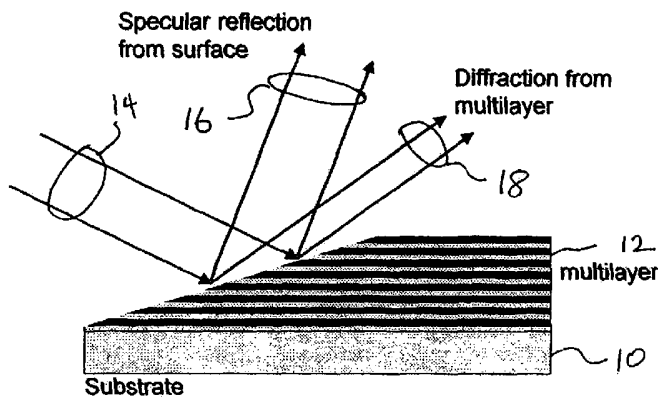
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- Published:  
— with international search report

[Continued on next page]

(54) Title: A HIGH-EFFICIENCY SPECTRAL PURITY FILTER FOR EUV LITHOGRAPHY



(57) Abstract: An asymmetric-cut multilayer diffracts EUV light. A multilayer cut at an angle has the same properties as a blazed grating, and has been demonstrated to have near-perfect performance. Instead of having to nano-fabricate a grating structure with imperfections no greater than several tens of nanometers, a thick multilayer is grown on a substrate and then cut at an inclined angle using coarse and inexpensive methods. Effective grating periods can be produced this way that are 10 to 100 times smaller than those produced today, and the diffraction efficiency of these asymmetric gratings is higher than conventional gratings. Besides their ease of manufacture, the use of an asymmetric multilayer as a spectral purity filter does not require that the design of an EUV optical system be modified in any way, unlike the proposed use of blazed gratings for such systems.



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2 March 2006

*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/US2005/019486

**A. CLASSIFICATION OF SUBJECT MATTER**  
G03F7/20 G21K1/06

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)  
G03F G21K

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, PAJ, INSPEC

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 848 119 A (MIYAKE ET AL) 8 December 1998 (1998-12-08) column 2, lines 61-67 column 3, lines 41-51 column 6, lines 18-27 claim 3	1-8
Y	----- LEVASHOV V E ET AL: "High throughput and resolution compact spectrograph for the 124-250 A range based on MoSi <sub>2</sub> -Si sliced multilayer grating" OPTICS COMMUNICATIONS NETHERLANDS, vol. 109, no. 1-2, 15 June 1994 (1994-06-15), pages 1-4, XP002354621 the whole document ----- -/--	1-8

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
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- \*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

Date of the actual completion of the international search  17 November 2005	Date of mailing of the international search report  30/11/2005
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Name and mailing address of the ISA 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	Authorized officer  Eisner, K
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INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US2005/019486

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 287 395 A (KHOUNSARY ET AL) 15 February 1994 (1994-02-15) column 1, line 50 - column 2, line 17 -----	1-8

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No  
PCT/US2005/019486

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 5848119	A	08-12-1998	JP	3167095 B2	14-05-2001
			JP	9021900 A	21-01-1997
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US 5287395	A	15-02-1994	NONE		
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