Title: SURFACE PLASMON ENHANCED ILLUMINATION SYSTEM

Abstract: Methods and apparatus for producing small, bright nanometric light sources from apertures that are smaller than the wavelength of the emitted light. Light (437) is directed at a surface layer (435) of metal onto a light barrier structure that includes one or more apertures each of which directs a small spot of light onto a target. The incident light excites surface plasmons (452) "electron density fluctuations" in the top metal surface layer and this energy couples through the apertures to the opposing surface where it is emitted as light from the apertures from the rims of the apertures. Means are employed to prevent or severely limit the extent to which surface plasmons are induced on the surface at the aperture exit, thereby constraining the resulting emissions to small target areas. The resulting small spot illumination may be used to increase the resolution, photolithographic processes, and storage capacity of microscopes.
MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW). Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BE, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).


Published:
— with international search report

(88) Date of publication of the international search report: 18 September 2003

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/US02/26072

## A. CLASSIFICATION OF SUBJECT MATTER

**IPC(7)**: C25D 11/02; H01L 27/12; G01N 33/543

**US CL.**: 436/518; 257/32; 205/122

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)

U.S.: 436/518; 257/32; 205/122

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

NONE

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

USPTO APS EAST

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>US 5,888,371 A (QUATE) 30 March 1999 (30.03.1999), see entire document.</td>
<td>1,3,31,33,62,66</td>
</tr>
</tbody>
</table>

☐ Further documents are listed in the continuation of Box C. ☐ See patent family 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 application or patent 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 obvious when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

  "S" document member of the same patent family

Date of the actual completion of the international search

19 November 2002 (19.11.2002)

Date of mailing of the international search report

18 FEB 2003

Name and mailing address of the ISA/US

Commissioner of Patents and Trademarks

Box PCT

Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

ANTHONY QUASH

Telephone No. (703) 308-0956

Form PCT/ISA/210 (second sheet) (July 1998)