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(71) Applicant (for all designated States except US):

STRYKER TRAUMA GMBH [DE/DE]; Prof.-
Küntscher-Str. 1-5, 24232 Schönkirchen / Kiel (DE).

(72) Inventor; and

(75) Inventor/Applicant (for US only): SPEITLING, Andreas [DE/DE]; Oppendorfer Weg 36, 24149 Kiel (DE).

(74) Agent: MAIWALD PATENTANWALTS GmbH; Korbinian Kopf, Elisenhof, Elisenstr. 3, 80335 Munich (DE).

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Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

[Continued on next page]

(54) Title: ANTIMICROBIAL PROVISION OF TITANIUM AND TITANIUM ALLOYS WITH SILVER

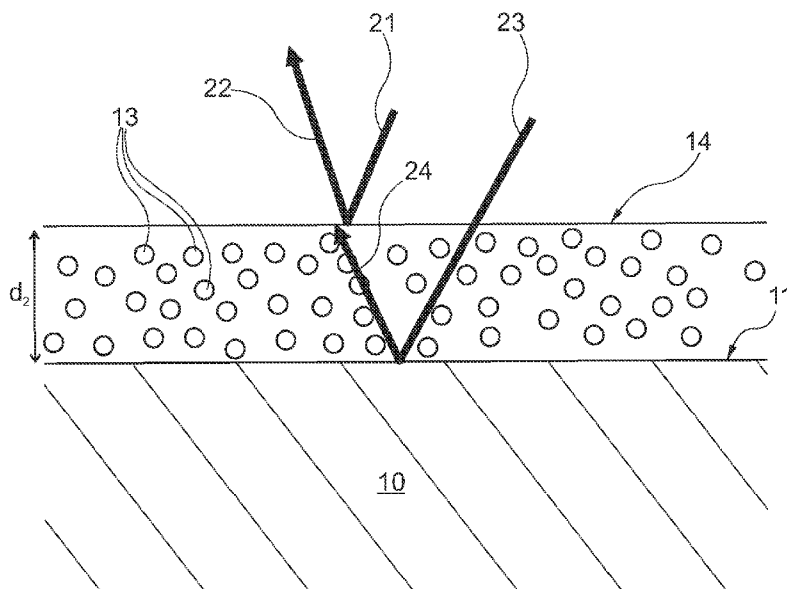


Fig. 1

(57) Abstract: A method for the antimicrobial provision of implant surfaces with silver, in which the method comprises an anodizing of the implant surface with an electrolyte, in which the electrolyte has a silver-yielding substance. Alternatively, the method comprises a silver implantation or a silver PVD deposition.



(88) Date of publication of the international search report:

11 March 2010

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2008/066604

A. CLASSIFICATION OF SUBJECT MATTER

INV. C25D11/26 C23C14/16 C23C14/24 C23C14/48 A61K6/04
A61L27/54

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)

C25D A61K A61L

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/221259 A1 (ANDERSON DUNCAN M [GB]) 6 October 2005 (2005-10-06) paragraphs [0009] - [0012], [0017], [0032]	1-4,7-8, 20-21
X	JP 2005 137801 A (SOKEN KK) 2 June 2005 (2005-06-02) paragraph [0033] - paragraph [0036] paragraphs [0043], [0048] figure 3	1-4,7-8, 20-21
X	EP 1 207 220 A1 (SOUKEN CORP [JP] GHA CORP [JP]) 22 May 2002 (2002-05-22) paragraph [0029] paragraph [0061] - paragraph [0063]	1-4,7-8, 20-21
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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 document but published on or after the international filing date

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

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"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

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"&" document member of the same patent family

Date of the actual completion of the international search

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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,
Fax: (+31-70) 340-3016

Authorized officer

Le Hervet, Morgan

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2008/066604

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 2007/181221 A1 (PICKFORD MARTIN E L [GB] ET AL) 9 August 2007 (2007-08-09) paragraphs [0014], [0015] -----	1-10
X	WAN ET AL: "Surface modification of medical metals by ion implantation of silver and copper" VACUUM, PERGAMON PRESS, GB, vol. 81, no. 9, 11 May 2007 (2007-05-11), pages 1114-1118, XP022070805 ISSN: 0042-207X the whole document -----	11,13, 20-21
X	ZHAO ET AL: "Bactericidal and corrosive properties of silver implanted TiN thin films coated on AISI317 stainless steel" SURFACE AND COATINGS TECHNOLOGY, ELSEVIER, AMSTERDAM, NL, vol. 201, no. 9-11, 31 January 2007 (2007-01-31), pages 5676-5679, XP005738744 ISSN: 0257-8972 the whole document -----	11,20-21
X	EWALD ANDREA ET AL: "Antimicrobial titanium/silver PVD coatings on titanium" BIOMEDICAL ENGINEERING ONLINE, BIOMED CENTRAL LTD, LONDON, GB, vol. 5, no. 1, 24 March 2006 (2006-03-24), page 22, XP021018047 ISSN: 1475-925X the whole document -----	14, 16-18, 20-21
A	DISEGI J A ED - BUMGARDNER J D ET AL: "Anodizing treatments for titanium implants" BIOMEDICAL ENGINEERING CONFERENCE, 1997., PROCEEDINGS OF THE 1997 SIXT EENTH SOUTHERN BILOXI, MS, USA 4-6 APRIL 1997, NEW YORK, NY, USA, IEEE, US, 4 April 1997 (1997-04-04), pages 129-132, XP010219420 ISBN: 978-0-7803-3869-2 the whole document -----	12,15,19
A	JUNG-YOON CHO, KYUNG-HO KIM, KWANG-CHUL CHOY, KEUN-TAEK OH, KYOUNG-NAM KIM: "Photocatalytic antibacterial effect of TiO ₂ film formed on Ti and TiAg exposed to Lactobacillus acidophilus" JOURNAL OF BIOMEDICAL MATERIALS RESEARCH PART B: APPLIED BIOMATERIALS, vol. 80B, no. 2, 18 July 2006 (2006-07-18), pages 353-359, XP002562873 the whole document -----	12,14,19
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INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2008/066604

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	G. J. CHI ET AL: "Antibacterial activity of anodized aluminum with deposited silver" SURFACE AND COATINGS TECHNOLOGY, vol. 157, no. 2-3, 6 May 2002 (2002-05-06) , pages 162-165, XP002562874 the whole document -----	12,15,19
A	SHIRKHAZADEH M ET AL: "Bioactive delivery systems for the slow release of antibiotics: Incorporation of Ag<+> ions into micro-porous hydroxyapatite coatings" MATERIALS LETTERS, NORTH HOLLAND PUBLISHING COMPANY. AMSTERDAM, NL, vol. 24, no. 1-3, 1 June 1995 (1995-06-01) , pages 7-12, XP004067079 ISSN: 0167-577X the whole document -----	12,15,19

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2008/066604

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 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 No. III Observations where unity of invention is lacking (Continuation of item 3 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 fees, this Authority did not invite payment of additional fees.
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.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-10(completely); 20-21(partially)

A method for the antimicrobial provision of implant with silver, comprising an anodizing step.

2. claims: 11-13(completely); 20-21(partially)

A method for the antimicrobial provision of implant with silver, comprising a silver implantation.

3. claims: 14-19(completely); 20-21(partially)

A method for the antimicrobial provision of implant with silver, comprising a physical gas phase deposition.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2008/066604

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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