



(11) **EP 2 345 419 B8**

(12) **CORRECTED EUROPEAN PATENT SPECIFICATION**

(15) Correction information:  
**Corrected version no 1 (W1 B1)**  
**Corrections, see**  
**Bibliography INID code(s) 73**

(48) Corrigendum issued on:  
**26.04.2017 Bulletin 2017/17**

(45) Date of publication and mention  
of the grant of the patent:  
**22.02.2017 Bulletin 2017/08**

(21) Application number: **09823688.8**

(22) Date of filing: **30.10.2009**

(51) Int Cl.:  
**A61K 39/39** <sup>(2006.01)</sup> **A61K 39/00** <sup>(2006.01)</sup>  
**A61K 39/002** <sup>(2006.01)</sup> **A61K 39/02** <sup>(2006.01)</sup>  
**A61K 39/08** <sup>(2006.01)</sup> **A61K 39/12** <sup>(2006.01)</sup>  
**A61K 9/10** <sup>(2006.01)</sup> **A61K 9/06** <sup>(2006.01)</sup>  
**A61K 47/28** <sup>(2006.01)</sup> **A61K 47/36** <sup>(2006.01)</sup>  
**A61K 47/61** <sup>(2017.01)</sup> **A61K 9/51** <sup>(2006.01)</sup>  
**A61P 31/04** <sup>(2006.01)</sup> **A61P 31/10** <sup>(2006.01)</sup>  
**A61P 31/12** <sup>(2006.01)</sup> **A61P 31/18** <sup>(2006.01)</sup>  
**A61P 33/02** <sup>(2006.01)</sup> **A61K 9/00** <sup>(2006.01)</sup>

(86) International application number:  
**PCT/JP2009/068647**

(87) International publication number:  
**WO 2010/050578 (06.05.2010 Gazette 2010/18)**

(54) **MUCOSAL VACCINE USING CATIONIC NANOGEL**

SCHLEIMHAUTIMPfstoff MIT EINEM KATIONISCHEN NANOGEL

VACCIN MUCOSAL UTILISANT UN NANOGEL CATIONIQUE

(84) Designated Contracting States:  
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR**  
**HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL**  
**PT RO SE SI SK SM TR**

(30) Priority: **31.10.2008 JP 2008281065**

(43) Date of publication of application:  
**20.07.2011 Bulletin 2011/29**

(73) Proprietor: **Intellectual Property Strategy Network,**  
**Inc.**  
**Chiyoda-ku**  
**Tokyo 100-0005 (JP)**

(72) Inventors:  
• **AKIYOSHI Kazunari**  
**Tokyo 113-8510 (JP)**  
• **KIYONO Hiroshi**  
**Tokyo 112-0013 (JP)**  
• **YUKI Yoshikazu**  
**Tokyo 113-0033 (JP)**  
• **NOCHI Tomonori**  
**Chapel Hill**  
**North Carolina 27516 (US)**

(74) Representative: **Tollervey, Rebecca Marie et al**  
**Mewburn Ellis LLP**  
**City Tower**  
**40 Basinghall Street**  
**London EC2V 5DE (GB)**

(56) References cited:  
**WO-A1-98/09650 JP-A- 2007 252 304**  
**JP-A- 2008 231 343 US-B1- 6 656 481**

- **KAZUHIDE TSUJI ET AL: "Induction of immune response against NY-ESO-1 by CHP-NY-ESO-1 vaccination and immune regulation in a melanoma patient", CANCER IMMUNOLOGY, IMMUNOTHERAPY, SPRINGER, BERLIN, DE, vol. 57, no. 10, 1 March 2008 (2008-03-01), pages 1429-1437, XP019624401, ISSN: 1432-0851**
- **AKIYOSHI K ET AL: "Self-assembled hydrogel nanoparticle of cholesterol-bearing pullulan as a carrier of protein drugs: Complexation and stabilization of insulin", JOURNAL OF CONTROLLED RELEASE, ELSEVIER, AMSTERDAM, NL, vol. 54, no. 3, 14 August 1998 (1998-08-14), pages 313-320, XP004147061, ISSN: 0168-3659, DOI: 10.1016/S0168-3659(98)00017-0**

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

**EP 2 345 419 B8**

- S. KITANO ET AL: "HER2-Specific T-Cell Immune Responses in Patients Vaccinated with Truncated HER2 Protein Complexed with Nanogels of Cholesteryl Pullulan", *CLINICAL CANCER RESEARCH*, vol. 12, no. 24, 15 December 2006 (2006-12-15), pages 7397-7405, XP055062075, ISSN: 1078-0432, DOI: 10.1158/1078-0432.CCR-06-1546
- SHINICHI KAGEYAMA ET AL: "Humoral immune responses in patients vaccinated with 1-146 HER2 protein complexed with cholesteryl pullulan nanogel", *CANCER SCIENCE*, vol. 99, no. 3, 1 March 2008 (2008-03-01), pages 601-607, XP055062074, ISSN: 1347-9032, DOI: 10.1111/j.1349-7006.2007.00705.x
- BACON A ET AL: "Carbohydrate biopolymers enhance antibody responses to mucosally delivered vaccine antigens", *INFECTION AND IMMUNITY, AMERICAN SOCIETY FOR MACROBIOLOGY, USA*, vol. 68, no. 10, 1 January 2001 (2001-01-01), pages 5764-5770, XP009169468, ISSN: 0019-9567
- ILLUM L ET AL: "CHITOSAN AS A NOVEL NASAL DELIVERY SYSTEM FOR VACCINES", *ADVANCED DRUG DELIVERY REVIEWS, ELSEVIER BV, AMSTERDAM, NL*, vol. 51, no. 1-03, 23 September 2001 (2001-09-23), pages 81-96, XP001115064, ISSN: 0169-409X, DOI: 10.1016/S0169-409X(01)00171-5
- DES RIEUX A ET AL: "Nanoparticles as potential oral delivery systems of proteins and vaccines: A mechanistic approach", *JOURNAL OF CONTROLLED RELEASE, ELSEVIER, AMSTERDAM, NL*, vol. 116, no. 1, 10 November 2006 (2006-11-10), pages 1-27, XP024957681, ISSN: 0168-3659, DOI: 10.1016/J.JCONREL.2006.08.013 [retrieved on 2006-11-10]
- PEEK L J ET AL: "Nanotechnology in vaccine delivery", *ADVANCED DRUG DELIVERY REVIEWS, ELSEVIER BV, AMSTERDAM, NL*, vol. 60, no. 8, 22 May 2008 (2008-05-22), pages 915-928, XP022624679, ISSN: 0169-409X, DOI: 10.1016/J.ADDR.2007.05.017 [retrieved on 2008-02-07]
- NOCHI TOMONORI ET AL: "Nanogel antigenic protein-delivery system for adjuvant-free intranasal vaccines", *NATURE MATERIALS, NATURE PUBLISHING GROUP, GB*, vol. 9, no. 7, 1 July 2010 (2010-07-01), pages 572-578, XP009169464, ISSN: 1476-1122, DOI: 10.1038/NMAT2784
- TOITA SAYAKA ET AL: "Protein-conjugated quantum dots effectively delivered into living cells by a cationic nanogel.", *JOURNAL OF NANOSCIENCE AND NANOTECHNOLOGY MAY 2008*, vol. 8, no. 5, May 2008 (2008-05), pages 2279-2285, XP009178643, ISSN: 1533-4880
- SATOH K ET AL: "Nanoparticle of cholesterol-bearing pullulan as a carrier of anticancer drugs", *EUROPEAN JOURNAL OF CANCER. SUPPLEMENT, PERGAMON, OXFORD, GB*, vol. 6, no. 9, 1 July 2008 (2008-07-01), page 139, XP022834053, ISSN: 1359-6349, DOI: 10.1016/S1359-6349(08)71707-5 [retrieved on 2008-07-01]
- R.J Soane ET AL: "Evaluation of the clearance characteristics of bioadhesive systems in humans", *International Journal of Pharmaceutics*, vol. 178, no. 1, 1 February 1999 (1999-02-01), pages 55-65, XP055124843, ISSN: 0378-5173, DOI: 10.1016/S0378-5173(98)00367-6