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Fig. 1

(57) Abstract: The present disclosure provides novel oligo phenylene ethynylene (OPE) compounds, methods for synthesizing these compounds, and materials and substances incorporating these compounds. The various OPEs show antibacterial, antiviral and anti-fungal activity.

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## INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/US2011/043908****A. CLASSIFICATION OF SUBJECT MATTER***C07D 471/08(2006.01)i, C07C 217/14(2006.01)i, C07D 333/10(2006.01)i, A61K 31/551(2006.01)i, A61P 31/04(2006.01)i*

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)

C07D 471/08; B05D 5/12; B05D 3/00; C07C 69/76; C07C 211/63

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) &amp; Keywords: "oligo phenylene ethynylene (OPE) compounds", "antibacterial, antiviral and antifungal activity"

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Wang, Y. et al. Membrane Perturbation Activity of Cationic Phenylene Ethylene Oligomers and Polymers: Selectivity against Model Bacterial and Mammalian Membranes. <i>Langmuir</i> , 29 June 2010, Vol. 26, No 15, Pages 12509-12514.	1,4,7,11-17,20,23,27
A	See page 1, column 1 : lines 5-9 and Scheme 1.	2-3,5-6,8-10
X	WO 2009-158606 A9 (STC.UNM et al.) 30 December 2009	1,4,11,15-17,20,27
A	See claims 9-10 and 15.	2-3,5-10,12-14,18-19,21-26
A	Tang, Yanli et al. Synthesis, Self-Assembly, and Photophysical Behavior of Oligo Phenylene Ethynylenes: From Molecular to Supramolecular Properties. <i>Langmuir</i> , 2009, Vol. 25, Pages 21-25. See Introduction, page 21: Scheme 1.	1-27
A	US 2008-0090021 A1(17 April 2008). See pages 3-4: example 4.	1-27

 Further documents are listed in the continuation of Box C. See patent family annex.

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2009-158606 A9	30.12.2009	EP 2307350 A2	13.04.2011
		US 2011-223058 A1	15.09.2011
		WO 2009-158606 A3	30.12.2009
		WO 2009-158606 A3	17.06.2010
US 2008-0090021 A1	17.04.2008	US 2006-0172126 A1	03.08.2006
		US 2008-0124550 A1	29.05.2008
		US 7318962 B2	15.01.2008
		US 7482041 B2	27.01.2009
		US 7670680 B2	02.03.2010