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(54) Title: DEVICE FOR THERMALLY DENATURING BIOMOLECULE AND METHOD FOR PRODUCING DEVICE

(57) Abstract: The present disclosure provides methods and systems that can reduce the amount of sample necessary to detect or identify, or both detect and identify, a biomolecule, and increase the rate of denaturing of the biomolecule. A device for thermally denaturing a biomolecule may include: a substrate having low thermal conductivity; a heater disposed adjacent to the substrate; a temperature sensor disposed adjacent to the substrate; a semiconductor oxide film disposed adjacent to the substrate, a nanochannel formed in a region of the semiconductor oxide film, and a cover over the nanochannel.

INTERNATIONAL SEARCH REPORT

International application No.
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<p>A. CLASSIFICATION OF SUBJECT MATTER</p> <p>Int.Cl. C12M1 / 00 (2006.01)i , B01J 19/ 00 (2006.01)i , G01N2 5/ 00 (2006.01)i , G01N3 7/ 00 (2006.01)i</p> <p>According to International Patent Classification (IPC) or to both national classification and IPC</p>														
<p>B. FIELDS SEARCHED</p> <p>Minimum documentation searched (classification system followed by classification symbols)</p> <p>Int.Cl. C12M1 / 00, B01J 19/ 00, G01N2 5/ 00, G01N3 7/ 00</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched <small>Published examined utility model applications of Japan 1922-1996 Published unexamined utility model applications of Japan 1971-2015 Registered utility model specifications of Japan 1996-2015 Published registered utility model applications of Japan 1994-2015</small></p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) CAplus /MEDLINE /BIOSIS (STN), JSTPlus/ JMEDPlus/ JST /bbU (JDreamJ1), Thomson Innovation</p>														
<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p> <table border="1"> <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>古橋 匡幸,他 6名, マイクロヒーターを用いた二本鎖 DNA の熱変性, 第 60 回応用物理学会春季学術講演会講演予稿集, 2013 Mar 11, p.12-356</td> <td>1-75</td> </tr> <tr> <td>Y</td> <td>FURUHASHI M.et al., High speed DNA denaturation using microheating devices, Appl.Phys. Lett., 2013 Jul 11,103 ,p.023112</td> <td>1-75</td> </tr> <tr> <td>Y</td> <td>NADASAN M.et al., Design and fabrication of the microchannels for microfluidics applications, U.P.B. Sci .Bull .,Series c ,2009, 71(4), p.125-34</td> <td>1-75</td> </tr> </tbody> </table>			Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	Y	古橋 匡幸,他 6名, マイクロヒーターを用いた二本鎖 DNA の熱変性, 第 60 回応用物理学会春季学術講演会講演予稿集, 2013 Mar 11, p.12-356	1-75	Y	FURUHASHI M.et al., High speed DNA denaturation using microheating devices, Appl.Phys. Lett., 2013 Jul 11,103 ,p.023112	1-75	Y	NADASAN M.et al., Design and fabrication of the microchannels for microfluidics applications, U.P.B. Sci .Bull .,Series c ,2009, 71(4), p.125-34	1-75
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<p>Date of the actual completion of the international search</p> <p align="center">12.02.2015</p>		<p>Date of mailing of the international search report</p> <p align="center">24.02.2015</p>												
<p>Name and mailing address of the ISA/JP</p> <p align="center">Japan Patent Office</p> <p>3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan</p>		<p>Authorized officer</p> <p align="center">Junya WATANABE</p> <p>Telephone No. +81-3-358 1-1 101 Ext. 3448</p>												
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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Y	KAJI N.et al., Separation of long DNA molecules by quartz nanopillar chips under a direct current electric field, Anal .Chem. ,2004 Jan 1,76 (1),p .15-22	1-75
Y	WO 2011/108540 A1 (OSAKA UNIVERSITY) 2011.09.09, claims 1-10 & US 2014/0300339 A	8-13, 33-40, 60-65
Y	谷口正輝, 医療用1分子バイオナノデバイスの開発, 日本W 象学会誌, 2013.02.10, 第52巻,第1号, pp. 51-60	8-13, 33-40, 60-65
P,X	古橋 匡幸,他 6名, マイクロヒーティングによるナノ流路内 DNA の熱%性, 第 74 回応m 理学会秋季学術講演会講演予稿集, 2013 Aug 31,p12-295	1-75