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(71) Applicant (for all designated States except US): **MASSACHUSETTS INSTITUTE OF TECHNOLOGY** [US/US]; Five Cambridge Center, Cambridge, MA 02142-1493 (US).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **LEE, Harry** [US/US]; 26 Hemenway Street, Apt. 32, Boston, MA 02115 (US).

(74) Agent: **GERBER, Monica, R.**; Patent Group, Choate, Hall & Stewart LLP, Two International Place, Boston, MA 02110 (US).

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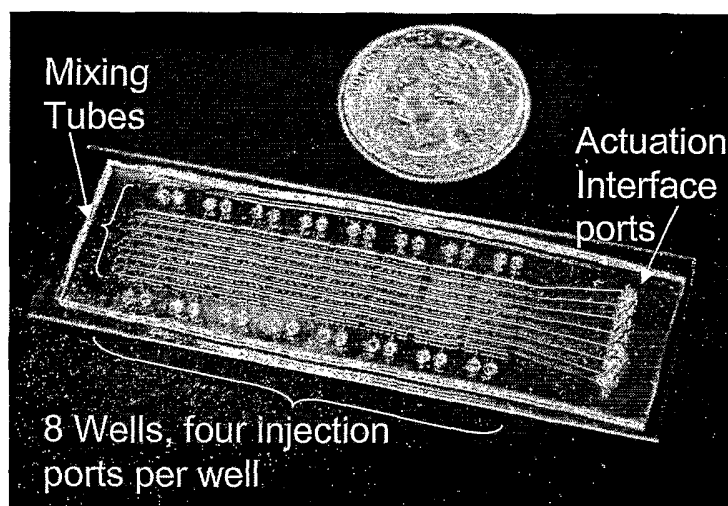
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28 December 2006

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.

(54) Title: PERISTALTIC MIXING AND OXYGENATION SYSTEM



(57) Abstract: The present invention provides devices and methods for achieving mixing and gas exchange in chambers having a small volume. According to the invention a chamber includes one or more walls that are made of a gas-permeable material and that include multiple portions that are selectively deflectable into the interior of the chamber. The deflectable portions are in communication with a hollow cavity or space that can be pressurized. Pressurization results in deflection of the deflectable portion into the chamber. Pressurization is achieved using a gas or fluid that contains a gas of interest such as oxygen. The portions are deflected in a sequence that results in peristaltic action that mixes and oxygenates the contents of

the chamber. In a preferred embodiment of the invention the hollow cavities are an assembly of tubes that deflect into a plurality of chambers. A particular use for the invention is as a culture vessel for cells such as bacteria.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/38432

A. CLASSIFICATION OF SUBJECT MATTER

IPC: **B01F 3/04** (2006.01); **C12N 1/32** (2006.01); **B29C 65/00** (2006.01)
F04B 17/00 (2006.01), 35/04 (2006.01)

USPC: 261/81, 122.1, 124; 435/243; 156/60, 290

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. : 261/81, 102, 104, 105, 121.1, 122.1, 122.2, 124; 435/243; 156/60, 290

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)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,029,581 A (CLOUGH, JR. et al) 14 June 1977 (14.06.1977), figs. 1-6.	1,2,5-20,26,30-37,43-48,53,54,56,63,65-75,80-86,89-92,98-112
X	US 4,793,714 A (GRUBER) 27 December 1988 (27.12.1988), figs. 1-4.	1,2,5-13,16,17,20,26,30,32-34,36,37,40-48,53,54,56,60,63-65,67,68,70,71,80-83,89,92,98,99,105-109
Y	US 5,081,035 A (HALBERSTADT et al) 14 January 1992 (14.01.1992), abstract; figs. 1 and 4; col. 5, lines 17-23,40; col. 6, lines 21-42; col. 7, lines 16-17,28-30,58-65; col. 8, lines 1-8,29-33.	1-18,20-71,80,86-99,103-112

☒ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

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Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Facsimile No. (571) 273-3201

Authorized officer

Scott Bushey

Telephone No. 571 272-1153

INTERNATIONAL SEARCH REPORTInternational application No.
PCT/US04/38432**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 6,039,309 A (KUKLINSKI) 21 March 2000 (21.03.2000), fig. 3.	1-109
A	US 6,267,837 B1 (MITCHELL et al) 31 July 2001 (31.07.2001), fig. 1.	113-124

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Continuation of B. FIELDS SEARCHED Item 3:

EAST Terms: gas, liquid, fluid, permeable, porous, porosity, moveable, deflectable, reciprocal, oscillating, pulsing, fluctuating, vibrating, chamber, vessel, container, reservoir, tank, housing, bag, wall, side, solubility, diffusivity, oxygen, carbon dioxide, elastomeric, rubber, PDMS, cell, culture, and variations thereof.