Application of Piezoelectric Micro Bubble Generator to Pulse Oximetry

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ABSTRACT

This research focuses on using the microelectromechanicalsystem (MEMS) technology to design and produce a micro bubble generator by piezoelectric actuator. The main structure use a ring shaped piezoelectric ceramic that is coupled a nickel nozzle plate. The piezoelectric plate has the characteristics of small size, high precision, easy control and fast response of frequency. Using the right design and the piezoelectric effect to power the piezoelectric plate will produce the vibration. The vibration contain enough energy to input oxygen gas into blood and trim off the micro bubble and spray them out. Improve the pulse oximetry in the blood by the very small bubble that the microbubble generator produces Micro bubble generator has two parts: piezoelectricity actuator and micro nickel nozzle plate. The research finishes two parts. First part has stuied the micro bubble producing methods and how the sizes of the bubbles. The next part is about the application of micro bubble generator to the blood actually then research the variation of the pulse oximetry.

Keywords : Piezoelectricity, Micro Bubble, microelectromechanicalsystem, Micro Electroforming, Micro-Ejector

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REFERENCES

[1] B. Bustgens, W. Bacher, W. Menz, W. K. Schomburg,“ Micropump Manufactured by Thermoplastic Molding, ” Micro Electro Mechanical Systems, MEMS, Proceedings, pp. 18-21,1994.

[2] 聖文德書院 http://0rz.tw/1a2Kj [3] 張淵竣，“ 廣用型血氧濃度儀系統初探:以視網膜為例， ’’ 碩士論文，私立中原大學電機工程學系，2004。

[4] Vogel, A., Lauterbrorn, W. & Timm, R.,“ Optical and acoustic investigations of the dynamics of laser-produced cavitation bubbles near a solid boundary, ” J.Fluid Mech. Vol. 206, pp. 299-338, 1989.

[5] 郭志祥，“ 水電式氣泡產生器的特性研究， ’’ 碩士論文，國立成功大學機械工程研究所，2003。

[6] Korpanty. G, Grayburn. PA, Shoet. RV, BreKKen. RA,“ Targeting vascular endothelium with avidin micro bubbles, ” Ultrasound Med Biol., Vol.31,No.9, pp. 1279-83, 2005.

[7] 李承翰，“ 高頻超音波血流成像， ’’ 碩士論文,國立台灣大學電機工程學研究所，2005。

[8] Unger E. Matsunaga TO, Schumann PA, Zutshi R,“ Microbubbles in Molecular Imaging and Therapy, ” Medicanumdi,Vol. 47,pp. 58-65, 2003.

[9] 飛華機電工程有限公司 http://www.feihwa.com.tw/index.htm [10] 姚培智，“ 壓電陶瓷總論及應用簡介， ” 國防部中山科學研究院材料研發中心，1995。

[11] 涂昇利，“ 新型壓電致動器的設計與製作， ’’ 碩士論文，私立大葉大學機械工程研究所，2001。

[12] 許文誌，“ 指叉型壓電元件極化之分析與製作， ’’ 碩士論文，私立大葉大學機械工程研究所，2004。

[13] 陳宛珂 撰,“ 磷脂質包覆豬血紅素作為人造紅血球之製備及其性質研究 ”, 1994。