DC Impedance Cytometry using Polyelectrolytic Gel Electrodes on a PDMS Microfluidic Chip

Hyoungseon Choi[1], Kwang Bok Kim[1], Sangyun Park[1], Taek Dong Chung[2] and Hee Chan Kim [3,4*]

1. Interdisciplinary Program, Bioengineering Major, Graduate School, Seoul National University, Seoul 110-744, Korea
2. Department of Chemistry, Seoul National University, Seoul 151-742, Korea
3. Department of Biomedical Engineering, College of Medicine, Seoul National University, Seoul 110-744, Korea
4. Institute of Medical & Biological Engineering, Medical Research Center, Seoul National University, Seoul 110-744, Korea

E-mail : hckim@snu.ac.kr

In biological researches and clinical examinations, chip-based flow cytometry is an important technology for its various capabilities like counting and characterizing particulates. Specially, DC impedance-based flow cytometry using our group's proprietary polyelectrolytic gel electrodes (PGEs) has advantages in system size and simplicity compared with other optical and AC impedance systems. Our key technology to fabricate PGE was possible only on the glass-like surface. However, glass chips are more difficult to mass produce and dimension control than PDMS chips. Therefore, we applied a sol-gel method to coat channel surfaces of the PDMS chip with a glass-like material. For the sol-gel method, we used tetraethoxysilane (TEOS) solution. Using the treated PDMS chip, we were able to keep narrow channel width even after locating PGEs. As performance evaluation of the proposed DC impedance-based cytometry on a PDMS chip, we tested the developed system with small particles under 5um in diameter. The results show that this proposed system has sufficient potential to be used in counting small-sized biological samples such as E.coli or bacteria.

References

[1] K. B. Kim, H. Chun, H. C. Kim, and T. D. Chung, *Electrophoresis*, **30**, 1-6 (2009).

[2] A. R. Abate, D. Lee, T. Do, C. Holtze and D. A. Weitz, *Lab on a Chip*, **8**, 516-518 (2008)

Topics :

1. **Nano and molecular technologies in medical diagnosis and therapy**
2. **Nanotechnology in drug delivery**
3. **Biomedical imaging**
4. **Biochips and Bio-MEMS**
5. **Biomechatronics**
6. **Cell at the nanoscale**
7. **Biological interface**
8. **Frontiers in nanobiotechnology**