QD06

Sorting $CD4^+$ T Cells in Blood by Magnetic Nanoparticles Coated with Anti-CD4 Antibody

N.T. Khuat[1], V.A.T. Nguyen[1], T.N. Phan[1], C.V. Thach[2], N.H. Hai*[2], N.H. Luong[2], N. Chau[2]

[1]Center for Molecular Biology and Cell Technology, Hanoi University of Science, Vietnam National University, Hanoi, 334 Nguyen Trai, Thanh Xuan, Hanoi, Vietnam

[2]Center for Materials Science, Hanoi University of Science, Vietnam National University, Hanoi, 334 Nguyen Trai, Thanh Xuan, Hanoi, Vietnam

*Corresponding author: nhhai@vnu.edu.vn, Phone: +84 4 558 2216, Fax: +84 4 858 9496

In immune deficiency disease of humans, such as HIV/AIDS, helper T cells are destroyed greatly because CD4 molecules available only on the surface membranes of helper T cells are primary targets of the viruses. Thus, the dropping number of helper $CD4^+$ T cells in blood is an indicator of immunodeficiency as in the case of AIDS. Fluorescent labelled anti-CD4 antibody has been commonly used to count $CD4^+$ T cells based on its binding specificity and fluorescent emission signals. However, the signals of fluorescent $CD4^+$ T cells are sometimes interfered by autofluorescence of dead cells which encounter background in detection. To minimize the background, $CD4^+$ T cells could be magnetically sorted from other cells in blood, followed by detection of fluorescent signals. In this report, we used magnetic nanoparticles (NPs) which are coated with FITC (fluoroisothiocyanate) labelled anti-CD4 antibody to selectively bind on the membranes of $CD4^+$ T cells. For preparation of fluorescent anti-CD4-magnetic NPs, Fe_3O_4 magnetic NPs were prepared by coprecipitation, and then functionalized by a single layer of surfactant. The functionalized NPs were mixed with FITC labelled anti-CD4 antibody through hydrophobic interaction, then followed by simply mixing with a mixture of blood cells. After removing the cells which were not labelled with FITC labelled anti-CD4 magnetic NPs using magnetic decantation, we observed the morphology and the signals of the fluorescence emitted from sorted cells. Number of the cells having the morphology of T-cells and emitting fluorescence when being excited by blue light of about 485 nm wavelength are obtained. Further experiments are needed to confirm the specific binding of FITC labelled anti-CD4-magnetic NPs toward helper $CD4^+$ T cells. Nevertheless, the alternative non-fluorescent anti-CD4 magnetic NPs are a potential material to sort the helper T cells observed by conventional microscopes which could be suitable for unequipped hospital laboratories.

QD07

Phase Transfer Study for Aqueous FePt Nanoparticles

C. S. Ho[1], P. C. Chiang[2], J. W. Wang[1], D. S. Hung[3]* and Y. D. Yao[4]

[1]Department of Materials Science and Engineering, Tunghai University, Taichung, Taiwan

[2]Research Center for Applied Sciences, Academia Sinica, Taipei, Taiwan

[3]Department of Information and Telecommunications Engineering, Ming Chuang University, Taoyuan, Taiwan

[4]Department of Materials Engineering, Tatung University, Taipei 104, Taiwan

*Corresponding author:dshung@mcu.edu.tw, Phone: +886 3 350 7001 ext 3392

Recent advances in the conjugation of nanoparticles and biomolecules attracted more attention on biotechnologies, because the sensitive nanoparticle-based bioprobes could be functionalized by various biomolecules binding onto the nanoparticle surface for targeting the selective cell/sequence and rapidly characterized the biosystem. Their potential biological application has directed to clinical diagnosis and regional treatment such as tumors [1][2]. However, the stunning application was greatly based on the surface modification for different specific molecular binding and water-dispersible characteristic. The previous function was required to bind various types of DNA/protein for biodetection. The second one was well-known as the fundamental requirement for several biological applications. In this paper, we reported the fabrication of FePt nanoparticles through the chemical reduction method and an effective method to phase transfer of FePt nanoparticles from organic to aqueous media. We used mercaptoacetic acid ($C_2H_4O_2S$) as a transfer reagent for particle surface modification. This result revealed that FePt nanoiparticles were hydrophilic through ligands exchange. Through TEM analysis showed that the size of the water-based FePt nanoparticles was ranged of 2nm-4nm in diameter. The magnetic property of the FePt particles from aqueous media was to be surparamagnetic. The successful phase transfer process was also confirmed by XPS data. We found that these results facilitated the use of the hydrophilic FePt nanoparticles for bio-magnetic applications.

REFERENCES

[1] M. Zheng, X. Huang, *J. Am. Chem. Soc.* **126** (2004), p. 12047.

[2] K. E. Elkins, T. S. Vedantam, J. P. Liu, H. Zeng, S. Sun, Y. Ding, Z. L.Wang, *Nano Lett.* **3** (2003), p. 1647.