

Synchrotron Radiation Phase Contrast Imaging for Clear Visualization of Magnetic Particles

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Citation: Tang. R. Synchrotron Radiation Phase Contrast Imaging for Clear Visualization of Magnetic Particles. (2016) *Bioinfo Proteom Img Anal* 2(2): 103- 104.

Received Date: July 07, 2016

Accepted Date: August 19, 2016

Published Date: August 25, 2016

DOI: 10.15436/2381-0793.16.1001

Introduction

Magnetic particles are broadly used for separating different components of a sample. The visualization of magnetic particles is very essential for qualification and quantification of the components. However, conventional x-ray imaging techniques still have difficulties to clearly show magnetic particles especially when their x-ray attenuation is weak. Synchrotron radiation (SR) phase contrast imaging (PCI) has been widely utilized to improve soft tissue contrast^[1-5]. In our study, SR absorption-based imaging (ABI) could not reveal the magnetic particles at all. In comparison, PCI could afford clear revelation of the beads (figure 1). The aggregation characteristics of magnetic particles under a magnet could also be evidently presented using PCI (figure 2). The results demonstrate that PCI has considerable potential for further detection studies by visibly displaying the magnetic particles.

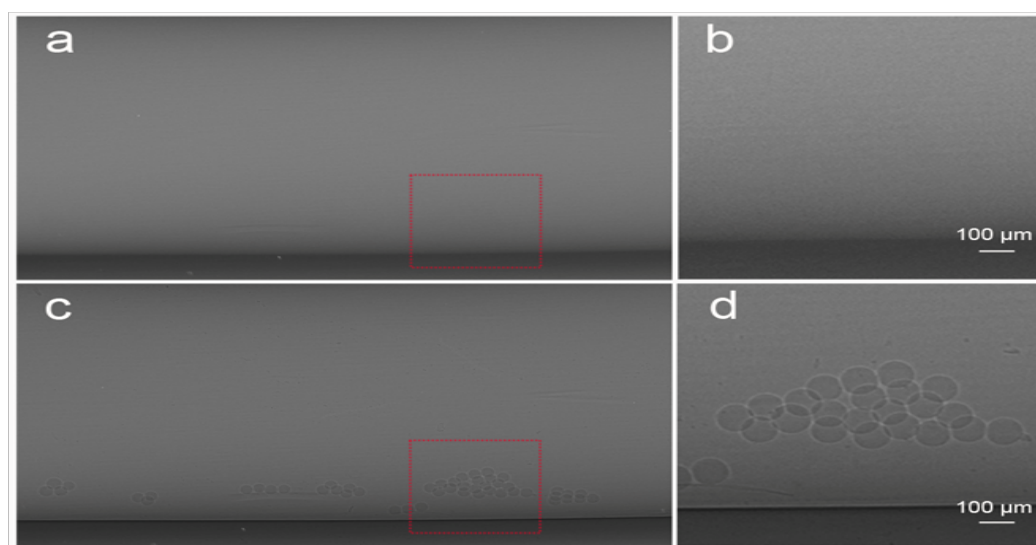


Figure 1: SR images of magnetic particles. (b) and (d) are magnified images of the region in a red box in (a) and (c), respectively. The magnetic particles could be clearly seen on phase contrast image (d), but not on absorption contrast image (b).

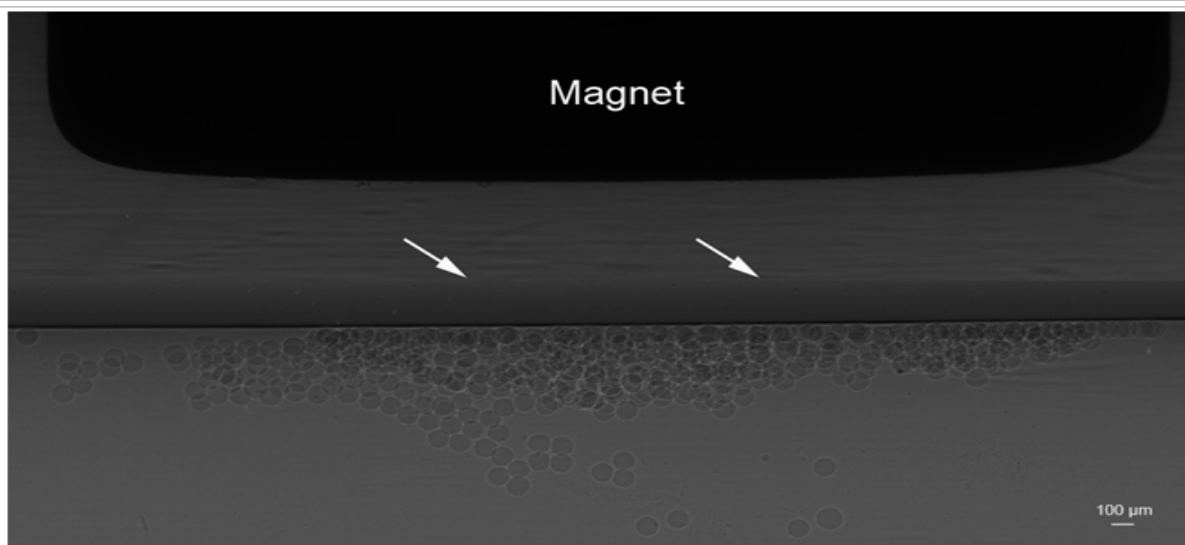


Figure 2: PCI of magnetic particles under the influence of a magnetic field. Many magnetic particles were found to assemble along the upper edge of PE tube (arrows) by placing a permanent magnet over the tube.

Acknowledgments: We thank the National Science Foundation of China (grants 81271740, 81301347, and 81471808), and SJTU Med-Science Cross Research Foundation (YG2013MS30).

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