

Motions of magnetic nanoparticles under magnetic field in the rectangular micro-channel flow

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The motions of the magnetic nanoparticles in the microchannel under the external magnetic field were visualized for biomedical application. Artificial vascular visualization system was made of the complex fluid (suspension of magnetic particles and fluid) flow system in the microchannel of sq I.D. 500 μ m by syringe pump. The magnetic fields act on a particle with Nd-Fe-B permanent magnet. The various forces acting on a particle, i.e. gravity, buoyancy, magnetic, inertial, drug force, etc. Balance equation with these forces was established to calculate motion of magnetic particles. The velocities by particle tracking were compared with theoretical velocities. With the visualization of particle motion under the two fields (flow and magnetic), a species of field flow fraction, the correlation between the flow field and the magnetic field can be appreciated. The area of visualization is extended as submicron magnetic particle. The motion of magnetic particle can be applied to achieve the effective drug delivery in human and cell separation or particles analysis.

Acknowledgements

The authors gratefully acknowledge financial support from Korea Science and Engineering Foundation (2004-0535-000), Republic of Korea.