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Effect of physical variables on capture of magnetic nanoparticles in simulated blood vessels[1] MINGHUI ZHANG, Carnegie Mellon University, CHRISTOPHER BRAZEL, University of Alabama — This study investigated how the percent capture of magnetic nanoparticles in a simulated vessel varies with physical variables. Magnetic nanoparticles (MNPs) can used as part of therapeutic or diagnostic materials for cancer patients. By capturing these devices with a magnetic field, the particles can be concentrated in an area of diseased tissue. In this study, flow of nanoparticles in simulated blood vessels was used to determine the affect of applying an external magnetic field. This study used maghemite nanoparticles as the MNPs and either water or Fetal Bovine Serum as the carrier fluid. A UV-Vis collected capture data. The percent capture of MNPs was positively influenced by five physical variables: larger vessel diameters, lower linear flow velocity, higher magnetic field strength, better dispersion, lower MNP concentration, and lower protein content in fluid. Free MNPs were also compared to micelles, with the free particles having more successful magnetic capture. Four factors contributed to these trends: the strength of the magnetic field's influence on the MNPs, the MNPs' interactions with other particles and the fluid, the momentum of the nanoparticles, and magnetic mass to total mass ratio of the flowing particles.

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