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Quantifying Heterogeneous Aggregation of Polymer Particles in Blood Plasma KATHLEEN MCENNIS, Chemical, Biological, Pharmaceutical Engineering, New Jersey Institute of Technology, JOERG LAHANN, Chemical Engineering, Macromolecular Science Engineering, Biomedical Engineering, and Materials Science Engineering, University of Michigan — Polymer particles are often studied as drug delivery vehicles, but little is known about their behavior in blood once injected into animal models. If the particles aggregate in blood, they will be removed from circulation instead of reaching the intended target. Typically dynamic light scattering (DLS) is used to analyze aggregation behavior, but DLS cannot be used in blood because the components of blood also scatter light. In this work, an alternative method of analyzing particles in blood plasma has been developed using nanoparticle tracking analysis (NTA) with fluorescent filters. NTA was used to analyze the aggregation behavior of fluorescent polystyrene particles (200 nm in diameter) in blood plasma. Particles were tested with polyethylene glycol (PEG) ligands and without any surface modification. A large number of heterogeneous aggregates of particles with components of the blood plasma were observed and quantified. The addition of PEG ligands was found to decrease the percentage of particles forming aggregates. The use of this characterization method will allow for better understanding of particle behavior in the body, and potential problems, specifically aggregation, can be addressed before investing in in vivo studies.

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