Abstract Submitted
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On-chip Micro- and Nanofluidic Electrokinetic Injection and Separation for PEGylation Analysis[1] ELIJAH SHELTON, MARY BAUM, DAN MORSE, SUMITA PENNATHUR, University of California, Santa Barbara, PENNATHUR NANOFLUIDICS LABORATORY COLLABORATION, MORSE LABORATORY COLLABORATION — We present an experimental study of micro- and nanofluidic electrokinetic injection and separation in borosilcate channels as a method for characterizing size and zeta potential of biomolecules–specifically polyethlylene glycol (PEG), keyhole limpet hemocyanine (KLH), and pegylated KLH. While pegylation (the conjugation of proteins with PEG) is an established technique for enhancing a protein's therapeutic properties, reliable characterization of these conjugations by traditional analysis techniques (i.e. gel-electrophoresis, zetasizer) remains a challenge. Using a three-step electrokinetic sequence (load, gate, and inject), FITC labeled species and a fluorescein tracer dye are injected into a channel where they separate according to differences in electrophoretic mobility. We find the average absolute mobility of pegylated subunit KLH in 1 micron channels to be 56% that of unpegylated subunit KLH. In a 250 nm channel, we measure a 33% shift in the average absolute mobility of PEG dendrimers as compared to measurements in a 1 micron channel. These results begin to demonstrate how a micro- and nanofluidic-based approach might address the demand for effective and accessible nanoparticle characterization platforms.

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