B92 The Development of an Entangled Polymer Solution for Improved Resolution in DNA Analysis Using a Portable Microfluidic Instrument

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After attending this presentation, attendees will understand the research being conducted in polymer solutions in DNA analysis. Upon completion of this research, the effect of mixing two different linear polymer solutions in DNA separation techniques such as Capillary Electrophoresis and Micro Electrophoresis systems will be known. The mixing of those two polymers at certain concentration and ratio has the potential of yielding very efficient coating capabilities and also improved resolution in DNA analysis. Other factors such as viscosity and migration time are also considered in the study.

This presentation will impact the forensic community by discussing hoe the development of this new polymer in DNA analysis will be advantageous to the forensic community by improving separation resolution and increasing the accuracy of many electrophoresis methods. Another important factor is that it could be used as a cheaper substitute to other commercially available polymer solutions.

The purpose of this project is to develop a novel entangled polymer solution that will permit the separation and genotyping of DNA in microfluidic channels. This solution will consist of a combination of two different polymers, polyvinyl pyrrolidone (PVP) and hydroxyethyl cellulose (HEC) in an appropriate buffer. PVP is a low viscosity polymer with excellent wall coating characteristics while HEC is more viscous but less interactive with the channel wall. The effect of various mixtures of these two polymers on the separation and resolution of various DNA fragments will be examined using capillary electrophoresis. By determining the effect of various parameters such as concentration, weight percent, and viscosity on the resolution, the authors will work to develop an optimal separation media for use in microfluidic separations.

In these experiments, different concentrations of the aqueous polymers were pumped into silica capillaries. Then ROX labeled DNA was separated and detected at 15kV using an ABI 310 genetic analyzer (capillary electrophoresis system with laser induced fluorescence detection). A factorial based experimental design was then used to determine the optimal concentration and weight fraction of the two polymers. After finding the optimal sieving matrix, its capability to separate and detect genomic DNA will be examined using microchip based electrophoresis.

DNA, PVP, HEC

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