



Faculty of Engineering and Applied Science Chemical Engineering Seminar Series



Biofluidic Chip Design for Free Flow Isoelectric Focusing

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ABSTRACT

Even though isoelectric focusing (IEF) is a very useful technique for sample concentration and separation, it is very challenging to extract separated samples for further processing. Moreover, the continuous sample concentration and separation are not possible in the conventional IEF. To overcome these challenges, free flow isoelectric focusing (FFIEF) can be used in which a flow field is applied in the direction perpendicular to the applied electric field. However, efficient design of microfluidic chip is cumbersome for FFIEF process as one has to take care of both flow and electric field in addition to pH field. In this talk, we will present a new mathematical model to study the roles of flow and electric fields for efficient design of microfluidic chip for continuous separation of proteins from an initial well mixed solution. Results obtained from our model will be compared with experimental data to demonstrate the efficacy of the model. Finally, a new channel design will be presented to increase the separation resolution by introducing cross-stream flow velocity. Our results indicate that the separation resolution can be improved by three folds in this new design compare to the conventional straight channel design used in traditional experiments.