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Field amplified sample stacking and focusing in nanofluidic channels BRIAN STOREY, Olin College, JESS SUSTARICH, SUMITA PENNATHUR, UC Santa Barbara — One major obstacle in the widespread adoption of nanofluidic technology for bioanalytical systems is efficient detection of samples due to the inherently low numbers of molecules present in small channels. This work explores one of the most common preconcentration techniques, field-amplified sample stacking (FASS), in nanofluidic systems in efforts to alleviate this obstacle. Holding the ratio of background electrolyte concentrations constant, the parameters of channel height, strength of electric field, and electrolyte concentration are experimentally varied. Although in micron scale systems these parameters have little or no effect on the final concentration enhancement achieved, nanofluidic experiments show strong dependencies on each of these parameters. Further, nanofluidic systems demonstrate an increased concentration enhancement over what is predicted and realized in micro-scale counterparts. Accordingly, a theoretical model is developed that explains these observations and furthermore predicts a novel focusing mechanism that can explain the observed increase in concentration enhancement. The simple model is capable of predicting key experimental observations, while a model that incorporates more detail provides good comparisons to the experiment.

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