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DNA/Protein Concentration and Identification by Nano-Channel Electrokinetics GILAD YOSSIFON, HSUEH-CHIA CHANG, University of Notre Dame — Electric field focusing into charged nano-channels can concentrate and filter charged biological molecules. This transport specificity is further enhanced with sequence or receptor specific DNA probes and antibodies functionalized onto the channel wall or nano-colloids. Our theoretical and experimental studies show, however, the same field-focusing phenomenon can discharge mobile ions from the channel and produce a growing polarized layer outside the channel, both of which can significantly affect the I-V characteristics and molecular migration rate within the channel. Conversely, the presence of trapped molecules or nano-colloids can be sensitively detected with nano-channel impedance spectroscopy due to such field-focusing phenomena. We present several DC and AC electrokinetic techniques for concentrating, filtering and detecting biomolecules in nano-channels based on this principle.

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