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On the Effects of 3D Field Focusing at a Heterogeneous Permselective Surface on Concentration Polarization YOAV GREEN, GILAD YOSSIFON, Technion-Israel Institute of Technology — Understanding the effects of 2D and 3D geometric field focusing effects at the interface of a microreservoir-nanochannel system is of much importance in the growing field of electrokinetics and microfluidics. Such effects have been used in numerous and varying experimental systems but little theoretical work has been conducted to better understand these effects quantitatively. Previous studies made a number of oversimplifying assumptions regarding the geometry of the microreservior and its effects on concentration polarization so that the solution was valid only at certain limits. A 3D analytical solution is derived for the concentration and electric potential for an electrolyte undergoing concentration polarization. The effects of the both the microreservoir's and the permselective interface's geometry are investigated. It is shown that limiting current transported through the permselective surface is not only a function of the area but is strongly geometry dependent (i.e. rectangular or square surface). Additionally, it is shown that there is an amplification of the current density with increased field focusing effects which stands in agreement with previous experimental results.

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