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Embedding of electrodes within a microchannel interfacing a permselective medium for sensing and active control of the concentration-polarization layer GILAD YOSSIFON, SINWOOK PARK, Technion - Israel Institute of Technology — Previously, it has been shown that for a prescribed system, the diffusion length may be affected by any number of mechanisms including natural and forced convection, electroosmotic flow of the second kind and electro-convective instability. In all of the above mentioned cases the length of the diffusion layer is indirectly prescribed by the complicated competition between several mechanisms which are primarily dictated by the various system parameters and applied voltage. In contrast, we suggest that by embedding electrodes/heaters within a microchannel interfacing a permselective medium, the diffusion layer length may be controlled regardless of the dominating overlimiting current mechanism and system parameters. As well as demonstrating that the simple presence of electrodes can enhance mixing via induced-charge electrokinetic effects, we also offer a means of externally activating embedded electrodes and heaters to maintain external, dynamic control of the diffusion length. Such control is particularly important in applications requiring intense ion transport, such as electrodialysis. At the same time, we will also investigate means of suppressing these mechanisms which is of fundamental importance for sensing applications.

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