Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Directed Chemical Transport and Separation by Hydrogel Films containing Static and Dynamic Chemical Potential Gradients TSUNG-HAN TSAI, CHUNJIE ZHANG, HYUNG-JUN KOO, PAUL V. BRAUN, University of Illinois at Urbana-Champaign — Materials that can manipulate the anisotropic molecular transport through built-in chemical potential gradients offer new opportunities to process chemical agents. Different from electrophoresis and microfluidics, here the chemical potential gradients, which provide the driving forces for molecular transport, are incorporated in the diffusion media. The autonomous systems can independently control the anisotropic flux of molecules and thus do not need external inputs such as electric fields and flowing carrier phases. As model systems, we used hydrogels containing static and dynamic built-in chemical potential gradients to direct molecular transport, concentrate dilute analyte and separate mixtures. The static gradients are based on electrostatic and supramolecular interactions which are specifically designed for the target molecules. The dynamic active chemical potential gradients triggered by reversible ion exchange process can alter the hydrophilicity gradually to transport or separate target molecules.

Tsung-Han Tsai
University of Illinois at Urbana-Champaign

Date submitted: 14 Nov 2014 Electronic form version 1.4