Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Dynamic separation of macromolecules under temperature gradient[1] YUSUKE MAEDA, The Rockefeller University, Center for Studies in Physics and Biology, AXEL BUGUIN, Institut Curie, Centre de recherche, CNRS/UMR, ALBERT LIBCHABER, The Rockefeller University — Thermophoresis is a motion of suspensions in a fluid that are subjected to a temperature gradient. Although its effect is widely studied in case of single solute in water, little is known about how the mixture of different solutes is affected. We heated water with an infrared laser by $\Delta T_{\max}$=5C and ∇T=0.25C/um to induce thermophoresis of polyethylene glycol (PEG) and DNA. PEG is depleted from the hot region and results in a stationary gradient of its high volume fraction ϕ. Under this high concentration of PEG, DNA of small concentration is submitted to thermophoresis and osmotic pressure difference. The DNA shows regime of depletion, ring-like localization and accumulation as the volume fraction of PEG increases. As the osmotic force depends on the size of trapped solutes, DNA of different size accumulates at different regions. Depending whether the DNA size is below or above 5kbp a different scaling of position versus DNA size is observed. Thermal separation is a general phenomenon. It applies also to RNA and microbeads.

[1]YTM is supported by JSPS fellowship and M.Josee-H.Kravis fellowship from the Rockefeller University.

Yusuke Maeda
The Rockefeller University

Date submitted: 17 Nov 2010 Electronic form version 1.4