STRONG ACCUMULATION OF DNA AT A HEATED AIR-WATER INTERFACE. Jonathan Liu, Matthias Morasch and Dieter Braun, Systems Biophysics, Physics Department, NanoSystems Initiative Munich and Center for Nanoscience, Ludwig-Maximilians-Universität München, Amalienstrasse 54, 80799 München, Germany, email: dieter.braun@lmu.de

Temperature gradients provide an energy source for many nonequilibrium phenomena, from fluid convection to molecular thermophoresis. We investigate microfluidic dynamics at an air-water interface that is subjected to a temperature gradient. We show that DNA is trapped from bulk solution and accumulated near the contact line of the interface, reaching concentrations of >1000-fold increase. The accumulation happens rapidly – on the order of minutes – and exhibits both a temperature and DNA length dependence. We rationalize the findings with a simulation and conclude that the accumulation is the combined result of capillary flow, thermophoresis, and continuous evaporation-condensation cycles. At a scale of tens of microns, the above effects counteract the prominent Marangoni flow. The robust accumulation mechanism has broad implications, especially for studies on the origins of life where the accumulation at the water-air interface could lead to polymerization reactions of both peptides and oligonucleotides. The findings can be combined with previously discovered accumulation mechanisms from thermal convection and thermophoresis in bulk water [**PRL** 89:188103 (2002)] [**PNAS** 104, 9346–9351 (2007)][**PRL** 104, 188102 (2010)][**PNAS** 110, 8030-8035 (2013)][**Nature Chemistry** (2015) doi:10.1038/nchem.2155]