

Abstract Submitted  
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**On-chip isothermal, chemical cycling polymerase chain reaction (ccPCR)**<sup>1</sup> ALEXANDRE PERSAT, JUAN SANTIAGO, Stanford University — We demonstrate a novel ccPCR technique for microfluidic DNA amplification where temperature is held constant in space and time. The polymerase chain reaction is a platform of choice for biological assays and typically based on a three-step thermal cycling: DNA denaturation, primers annealing and extension by an enzyme. We here demonstrate a novel technique where high concentration chemical denaturants (solvents) denature DNA. We leverage the high electrophoretic mobility of DNA and the electrical neutrality of denaturants to achieve chemical cycling. We focus DNA with isotachopheresis (ITP); a robust electrophoretic preconcentration technique which generates strong electric field gradients and protects the sample from dispersion. We apply a pressure-driven flow to balance electromigration velocity and keep the DNA sample stationary in a microchannel. We drive the DNA through a series of high denaturant concentration zones. DNA denatures at high denaturant concentration. At low denaturant concentration, the enzyme creates complementary strands. DNA reaction kinetics are slower than buffer reactions involved in ITP. We demonstrate successful ccPCR amplification for detection of E. Coli. The ccPCR has the potential for simpler chemistry than traditional PCR.

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