The Polymerase Chain Reaction (PCR) is a basic method of DNA amplification for DNA analysis. The in vitro PCD allows to replicate any part of DNA in a short time. The PCR is a cycle process that contains three steps: denaturation, primer annealing and primer extension. Each of them have strictly defined temperature and must be repeated 20-40 times. The goal of the work was to built a silicon-glass PCR microreactor with three thermal areas that were thermally separated from each other by deep channels in order to limit heat transfer. The heaters and temperature sensors were integrated on-chip for better control of the PCR process.

The principle of operation

Construction of the microreactor

Theoretical temperature distribution on the surface of silicon wafer

Device technology

Summary

New flow-through PCR microreactor was design and successfully fabricated. Thermal properties of developed microreactor were tested. Very good thermal separation was obtained with water cooling system. Pressure and liquid flow ratio in reaction and cooling channels were checked. The device has to be tested to better describe its thermal properties, efficiency of PCR and replication process.