

Finite Element Modeling of Lab-on-Chip for T Lymphocyte Analysis

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Summary: The paper deals with the finite element modeling and simulation of lab-on-a-chip microfluidic device that is used for counting leukocytes in blood samples. Some aspects regarding the state of the art of lab-on-a-chip devices are presented. These microfluidic devices offer the possibility to perform certain determinations, as it is the case of T lymphocytes, which are impossible by current conventional equipment. Comsol Multiphysics, Stationary Laminar Flow Module was used for finite element modeling and simulating of device working, and for its geometric optimization. The velocities and the required travel time of the blood sample combined with the lysing and stop lysing substances, within two dedicated circuits are determined. These are formed by multiple coils, two counting channels for two cell types and a cells capture chamber. Then, the execution specifications of the lab-on-a-chip on a millimetric silicon wafer were delivered, by microtechnologies, the modelling results being validated.