

Analysis of capillary filling in micro channels for passive fluid dynamics in Nano lab on chip domain

Abstract

A fluid dynamics in a micro channel for analytical chemistry and different aspects of this type of flow for specific application has remained a long-acting problem in the last two decades considering its numerous applications in various fields, thus, Surface tension and wall adhesive forces are often used to transport fluid through micro channels in Micro Electromechanical system devices or to measure the transport and position of small amounts of fluid using micropipettes. Here we took the advantages of wall adhesion and surface tension at the air/fluid interface, fluid rises through the channel and study also calculate the velocity, pressure and shape and position of the fluid surface, the model consist of a capillary channel of radius $50\mu\text{m}$ and a chamber. The study demonstrated that the fluid freely flown into the chamber 2mm/s without using any external mechanism.

Keywords; Capillary, MEMS, Micro-Channel, Nano Lab on Chip, Passive, Reservoir