IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)
Facilities and Operations of Microgravity Experiments (5)

Author: Mr. Shivayya Hiremath
R V College of Engineering, Bengaluru, India, shivayyach.ae20@rvce.edu.in

Mr. Sanat Hegde
R V College of Engineering, Bengaluru, India, sshridharhegde.me20@rvce.edu.in
Mr. Pavan Achar
R V College of Engineering, Bengaluru, India, pavanachar.ae20@rvce.edu.in
Mr. CHINMAY KUNDAPUR
R V College of Engineering, Bengaluru, India, chinmaysk.ae19@rvce.edu.in
Mr. Aneesh Phatak
R V College of Engineering, Bengaluru, India, aneeshrphatak.ae19@rvce.edu.in
Ms. Aditi Tata
R V College of Engineering, Bengaluru, India, adititata12@gmail.com

SOLID-LIQUID PHASE CHANGE MICROPUMPS WITH GRAPHENE OXIDE MEMBRANE

Abstract

Microfluidic cards are ideal apparatus for cost effective and close to precise results expecting experiments. The non-specific and flexible nature of experimental setup makes the method explorable in any applicable domains to fit the requirements. Microfluidic experiments without Human intervention as in satellite projects for microbial studies under space regulations and expectation of accurate results are ill-starred. One amongst the many difficulties in such cases is inoculation under constraints. Satellite projects often employ external (external to fluidic cards) valves to control / actuate the flow. A suitable alternative are micropumps. A Miniaturized pump which relies on the physics of the phase change process is discussed in this research paper. The approach contains two immiscible fluids one being operating fluid that administers experiment and the other is actuating fluid that undergoes phase change.

This paper draws content from various studies for aided flows and compares them to non-aided flow to realize the potential of phase change micropumps under proposed design. This manuscript discusses a design of phase change micropumps and different actuation processes that can be used. The design proposition includes membranes developed using graphene oxide as an alternative for microvalves or external valves. This paper discusses the effectiveness of various aiding methods to drive the flow. Aiding methods mean any other physics in driving the flow such as magnetohydrodynamics and low voltage electrokinetic flow. This paper is focused on doing a comparison study of previously mentioned two or more methods.