Investigation of Heat Transfer Performance of Nanofluids Flow in a Microchannel

Authors **Anoop Kanjirakat, Reza Sadr**
Institution Texas A&M University at Qatar, Doha, Qatar
e mail anoop.baby@qatar.tamu.edu

Miniaturization and increase in performance of electronic devices, resulted in an increase of energy density loads generated. In recent times, micro-scale cooling devices such as microchannel heat sinks have evolved as a plausible solution to the above heat transfer challenge. Nanofluids emerged as a good candidate in improving the cooling performance of micro cooling systems. Nanofluids are colloidal suspensions consisting of nano-sized particles (less than 100nm) dispersed in a base fluid. Nanofluids are considered ideal for micro-channel devices because they not only improve the heat transfer capabilities, due to increased thermal conductivity, but also minimize the clogging problem. Present work experimentally investigates the heat transfer performance of nanofluids through a microchannel with constant temperature wall boundary condition. Laminar flow of SiO_2-water nanofluids inside a rectangular microchannel flow assembly is examined. The effect of flow rate on thermal performance of nanofluid is analyzed along with variation in thermo-physical properties. Interestingly, experimental results shows heat transfer enhancement at lower flow rates and heat transfer degradation at higher flow rates. Theoretical reasoning for this kind of opposing trend is given based on flow conditions and thermo-physical properties of nanofluids. Moreover, Novel near surface velocity measurement of Nanofluids compared with that of regular fluid at the same condition.