

MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)
Microgravity Experiments from Sub-Orbital to Orbital Platforms (3)

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SPACE EXPERIMENT PREPARATION: SELF-REWETTING FLUID FOR ENERGY
MANAGEMENT (SELENE)**Abstract**

SELENE is a space experiment under development to fly on the International space station (ISS). It aims to study potential benefits using self-rewetting fluids on heat transfer applications. In fact, self-rewetting fluids (SRFs) are specific water-alcohol mixtures that present an anomalous trend showing a minimum of surface tension with respect to temperature. After specific temperature conditions, depending by the type of SRF used, at the vapour liquid interface the inverse Marangoni convection is acting pulling liquid from cold to hot regions. This mechanism is preventing hot spots and so increasing operational condition of the heat transfer device. The objective of SELENE experiment is to study SRFs in mono-groove heat pipe conditions, quantifying the enhancing contribution on heat transfer performances of the SRF with respect to normal working fluids used in same temperature range. The development of SELENE has passed through the development of concentration an optical diagnostics to measure alcohol quantity along the experimental setup and to visualize meniscus curvature (linked to capillary pressure) at the liquid level. Some proposed techniques for the ISS experiment, to measure alcohol concentration and liquid shape have been developed at the Microgravity research Center (MRC-ULB) laboratory: the concentration technique is based on ultra-sensitive AC impedance spectroscopy of the liquid mixture which varies directly with the concentration of alcohol in the mixture (development in collaboration with the AUth university), meanwhile the optical technique is numerically reconstructing meniscus shape from pattern distortion projected on the bottom of the system. The breadboard setup has then be tested on Parabolic flight to visualize meniscus dynamic inside the experimental system and collecting preliminary microgravity data.