Research and Life at the University of Illinois at Urbana-Champaign

Daniel Orejon – Assistant Professor

I²CNER, Kyushu University - Thermal Science and Engineering Division

Abstract

As part of the I²CNER Foreign Exchange Program to promote international and collaborative research with the University of Illinois at Urbana-Champaign UIUC and other collaborating institutions, I spent 4 months at the Energy Research Transport Laboratory ERTL at UIUC. The ETRL at which I was appointed as Adjunct Assistant Professor, is directed by Dr. Nenad Miljkovic and is formed by more than 30 undergraduate and graduate students. The research carried out at ETRL spans from multidisciplinary fields from thermo-fluid science to interfacial phenomena, which are much in line with the research interests of the Thermal Science and Engineering Research Division at I²CNER.

During my stay at UIUC I started 3 new projects for the ETRL. On one hand, I developed and built a novel setup for the accurate measurement of the temperature of the gas phase near the interface of evaporating drops. The setup comprises an x-y-z stage, two E-type thermocouples with diameter ca. 50 µm and a data acquisition system from Measurement Computing built within a Drop Shape Analyser MCA-3 from Kyowa. The setup allows for the precise positioning of a thermocouple and the accurate acquisition of the temperature near the drop interface. This project will be continued by PhD candidates Alperen Gunay and Mohamed Mousa. On the other hand, while carrying out such preliminary experiments, I realized on the possibility of acquiring the temperature change of evaporating drops at the tip of a thermocouple due to evaporative cooling. Both setups and preliminary experimental observations are presented within this talk. In addition, in collaboration with Post-Doctoral Researcher Soumydadip Sett we built a new setup for the study of water harvesting from fog on substrates varying in wettability from hydrophilic to superhydrophobic. This work aims for the unification of methodology and experimental setup for reporting fog harvesting results.

Urbana-Champaign is a university town without many distractions and excellent to focus on research. Besides working on these new projects I had the chance to visit Purdue and Washington at St. Louis University, as well as Chicago and New York in my free time.

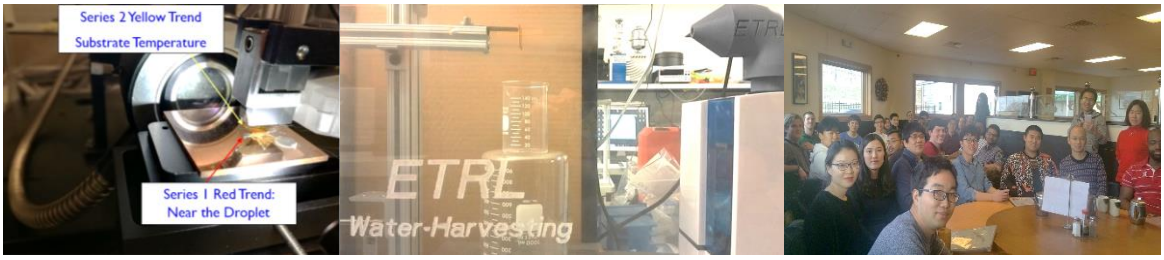

Figure – (left) Setup for the study of evaporating droplets on a thermocouple, (middle) water harvesting experimental setup, (right) ETRL on a social group outing.