

## SHORT TERM SCIENTIFIC MISSION (STSM) SCIENTIFIC REPORT

This report is submitted for approval by the STSM applicant to the STSM coordinator

**Action number: CA17136**

**STSM title: Investigating occupant related emissions**

**STSM start and end date: 08/04/2019 to 12/04/2019**

**Grantee name: Emer Duffy**

### PURPOSE OF THE STSM:

In April 2019 the Technical University of Denmark (DTU) launched a major human emission related indoor air chemistry study (I-CHEAR - Indoor Chemical Human Emissions and Reactivity) funded by the Sloan Foundation. This STSM supported the grantee to visit DTU during the launch of the I-CHEAR campaign to acquire new knowledge on whole-body emissions, indoor air chemistry and chamber studies from Gabriel Bekö, Charles Weschler, Glenn Morrison and other members of the I-CHEAR team, and to contribute her knowledge on localised dermal emissions which is complementary to the expertise of the team at DTU.

### DESCRIPTION OF WORK CARRIED OUT DURING THE STSM

During the STSM the grantee met daily with the I-CHEAR team who provided her an overview of the human emissions study including the instrumentation (PTR-ToF-MS, Fast GC, ozone, CO<sub>2</sub>, CO, CH<sub>4</sub>, H<sub>2</sub>O, bioaerosol and particle monitors), experimental set-up and sampling protocols. The grantee had the opportunity to visit DTU's indoor environment chambers including 22 m<sup>3</sup> twin stainless steel climate chambers and an aircraft cabin simulator. As part of the I-CHEAR campaign, the 22 m<sup>3</sup> stainless steel climate chambers were used to enclose groups of 4 human participants, where the participants served as sources of pollution. Filtered and conditioned outdoor air was supplied to the chamber and various environmental factors (e.g. temperature, humidity, different clothing) on occupant related emissions were investigated in real time using the suite of instrumentation on-site. Samples were also collected from the chamber after participants had left for subsequent chemical and microbiological analysis. The grantee had the opportunity to observe these chamber studies in action, and to discuss the experimental conditions, analytical instrumentation and data collection with the I-CHEAR team. The grantee also contributed her knowledge on localised dermal emissions during discussions with the team and she presented a seminar on "Wearable tools for investigating volatile organic compounds from human skin and indoor activities" in the Department of Civil Engineering at DTU.

### DESCRIPTION OF THE MAIN RESULTS OBTAINED

This STSM achieved the aim of enabling knowledge transfer between the grantee and the host in the area of human emissions, indoor air chemistry and chamber studies. It enabled the grantee to gain new scientific knowledge and experience in indoor air chemistry and chamber studies. By following the I-CHEAR campaign and interacting with the team during the experiments and data analysis, the grantee obtained a new understanding of the impact primary human emissions have on indoor air chemistry, and the importance of

carefully controlling participants' clothing, diet and use of personal care products during such a study. The grantee deepened her understanding of environmental influences on human emissions, by observing differences in the emission of skin products like geranyl acetone, 6-MHO and 4-OPA depending on clothing worn. She also gained new knowledge on humans as an ozone sink by observing ozone levels drop rapidly from 90 to 30 parts per billion after participants entered the chamber. The grantee had the opportunity to share her expertise on localised dermal emissions with the host during team discussions and through the seminar she presented.

**FUTURE COLLABORATIONS (if applicable)**

Provisional plans were made to visit Glen Morrison at the University of North Carolina at Chapel Hill for a joint study on human skin emissions in Summer 2019.