ANNEX A

PUBLIC SELECTION BASED ON QUALIFICATIONS AND INTERVIEW FOR THE AWARDING OF NO. 1 EARLY STAGE GRANT LASTING 12 MONTHS FOR CONDUCTING RESEARCH PURSUANT TO ART. 22 OF LAW NO. 240/2010 AT THE DEPARTMENT OF ENGINEERING AND APPLIED SCIENCES (A.R.F. 09/C2 THERMAL SCIENCES, ENERGY TECHNOLOGY, BUILDING PHYSICS AND NUCLEAR ENGINEERING - A.D. ING-IND/10 - THERMAL ENGINEERING AND INDUSTRIAL ENERGY SYSTEMS) TYPE B

announced with decree of the Rector Rep. no 311/2018 of 07.05.2018 and posted on the official registry of the University on 07.05.2018

RESEARCH PROJECT

"*Modelling the effect of evaporation on the oscillation of a liquid drop*"

Department of Engineering and applied sciences

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A.D. ING-IND/10 - Thermal engineering and industrial energy systems
A.R.F.: 09/C2 - Thermal sciences, energy technology, building physics and nuclear engineering

The evaporation process of dispersed liquid particles in a gaseous environment involves simultaneous heat and mass transfer. Since the particle is embedded in a gaseous environment, the Stefan flow introduces convective effects and consequently the problem of evaporation is far more complex than the relatively simple mass diffusion in liquid flows and more challenging from the scientific point of view. The simultaneous effect of surface tension and aerodynamic stresses acting on a drop in a gas stream induces departure for the equilibrium spherical shape and the incept of oscillations, which affect and are affected by heat and mass transfer.
The main objective of this project is to model the mass transfer rate and mass flux along the
surface of generally deformed drops in a gaseous environment, including the effect of a moving interface (drop oscillation) .
At a first step an analytical approach will be used, starting form available models of oscillating non-evaporating droplets and including the effect of evaporation. A comprehensive modelling will take into account the main issues of this problem and the following tasks are envisioned:

- General modelling of heat and mass transfer from non-oscillating complex particle shapes.
- Quantification of the effect of moving interface (oscillation) on heat and mass transfer and development of a comprehensive model.
- Evaluation of the effect of mass transfer on evaporation through simplified models, and application to large oscillations.
- Comparison with numerical modelling of the phenomena.

The last part will be performed within the collaboration with Stuttgart University (DROPIT project) through the use of the in-house code FS2D.