

Nanoparticle profiling: a comprehensive assessment of physical, chemical, and toxicological characteristics at Thessaloniki airport

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Introduction

Objective: Evaluate nanoparticles in proximity to the runway at Thessaloniki Airport during two periods (cold and warm).

Significance: Understanding nanoparticle characteristics and their potential health impacts on airport personnel, travelers and people that live/work in the area.

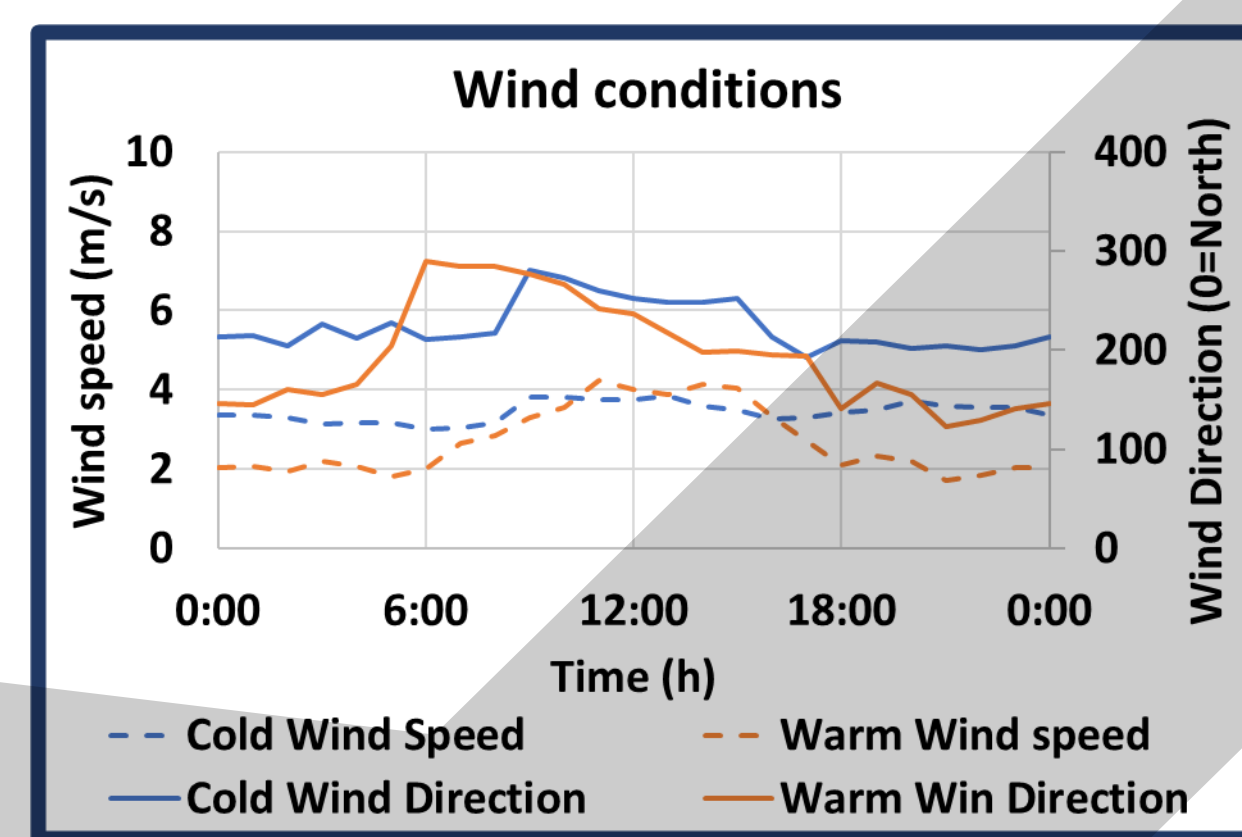
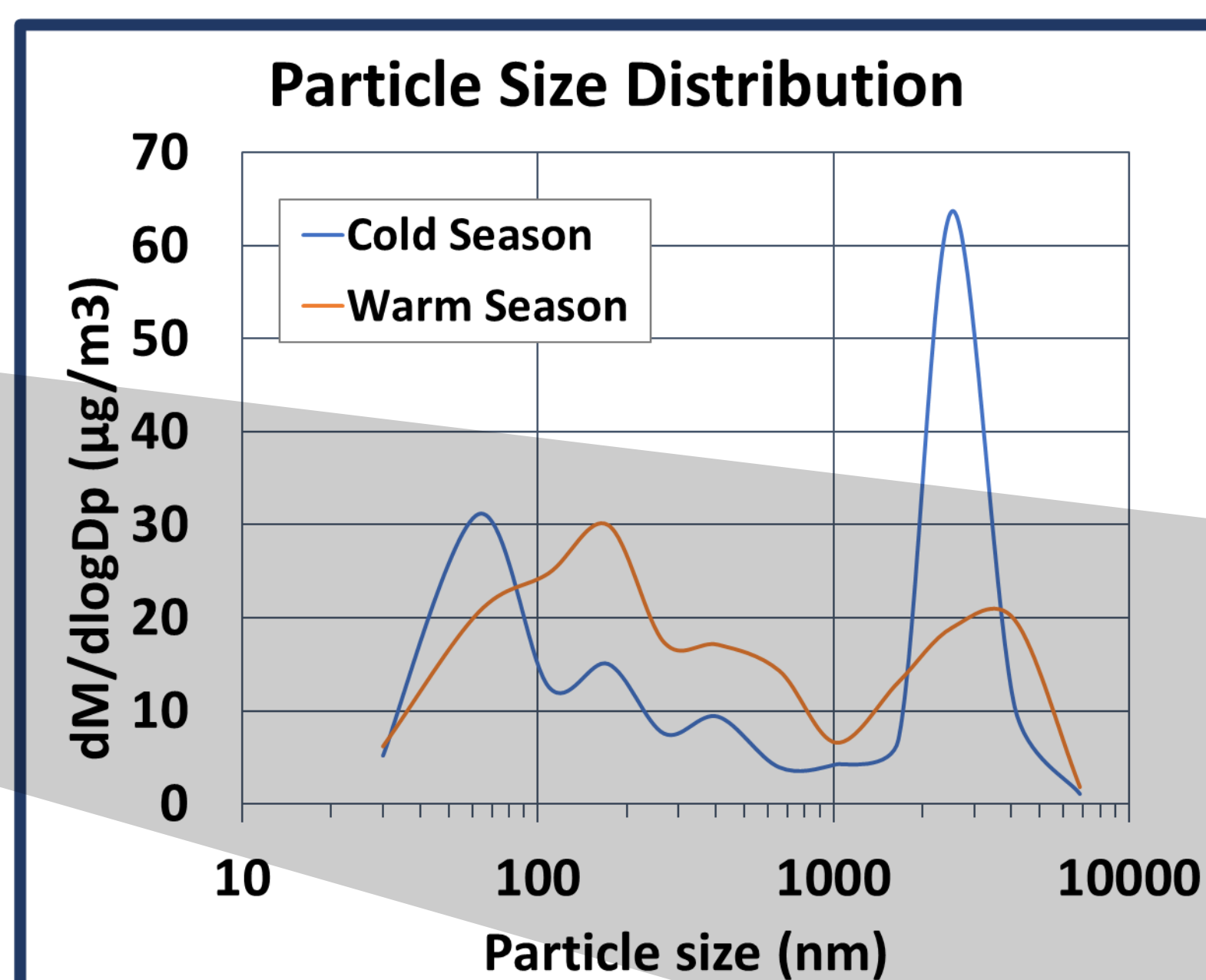
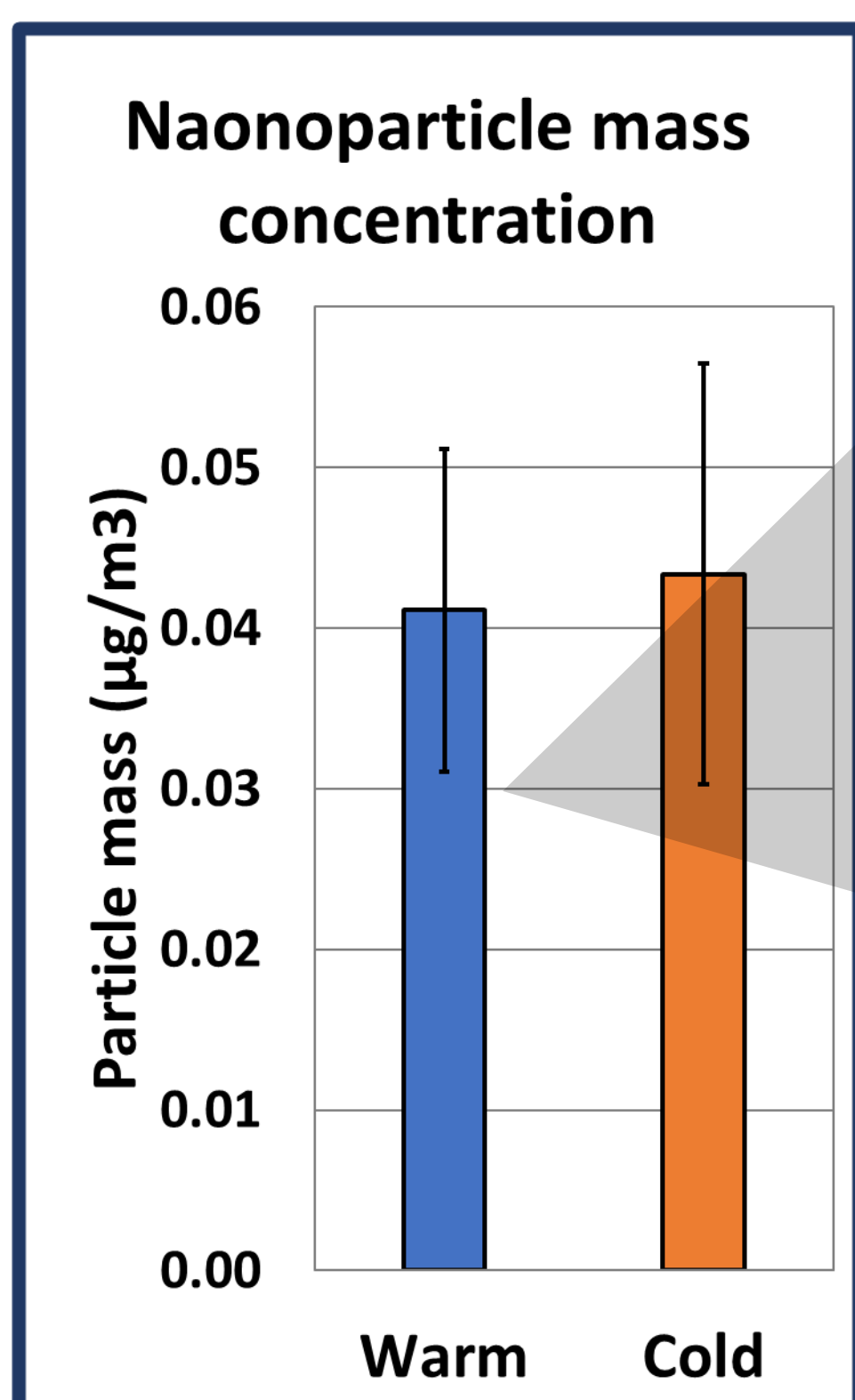
Methodology

- Sampling point: 200m from runway
- 2 Measurement Seasons: Cold-Warm (4 weeks each)
- 4 Air Liquid Interface cell exposures each season (2 hours each)

Full Nanoparticle Characterization

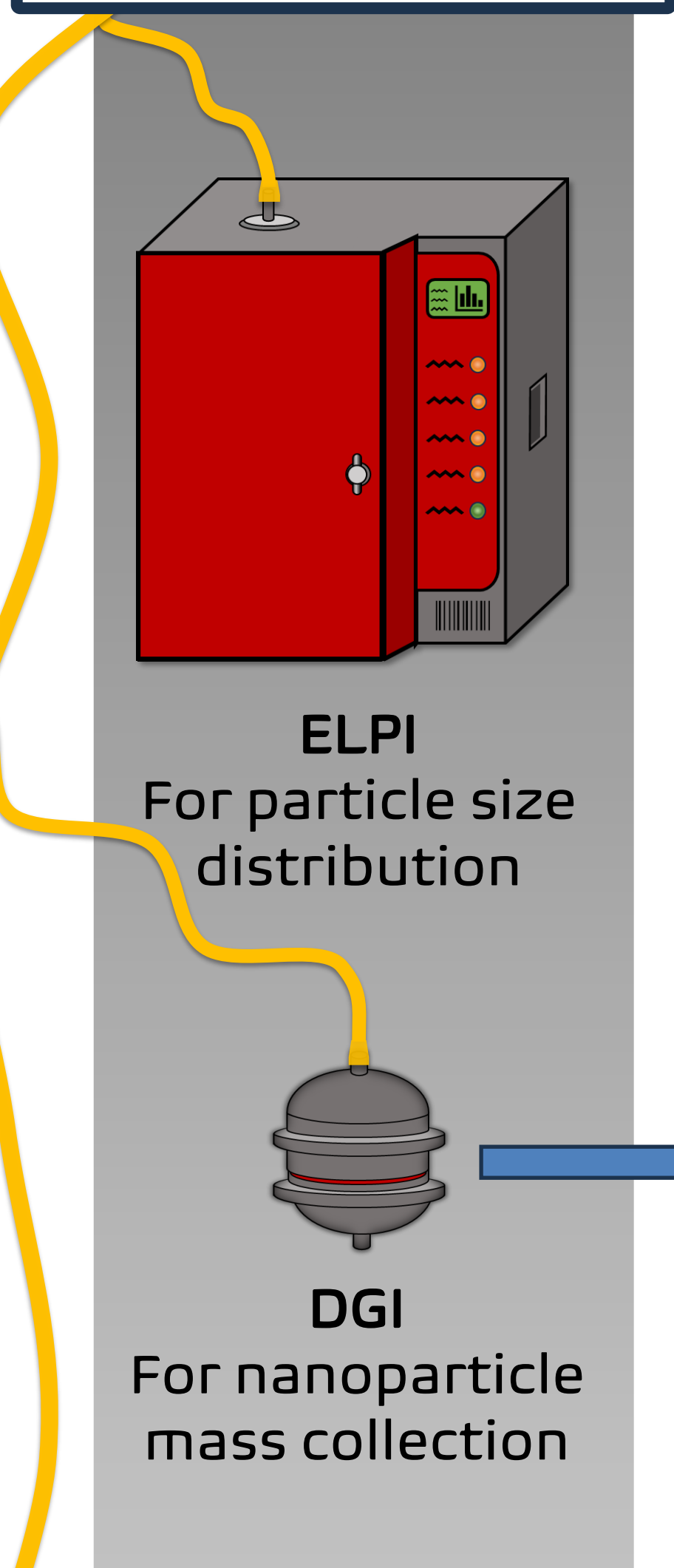
Physical: Particle Size Distribution, nanoparticle mass
Chemical: Polycyclic aromatic hydrocarbons (PAHs)
Toxicological: Cell viability assessment

Physical Characterization

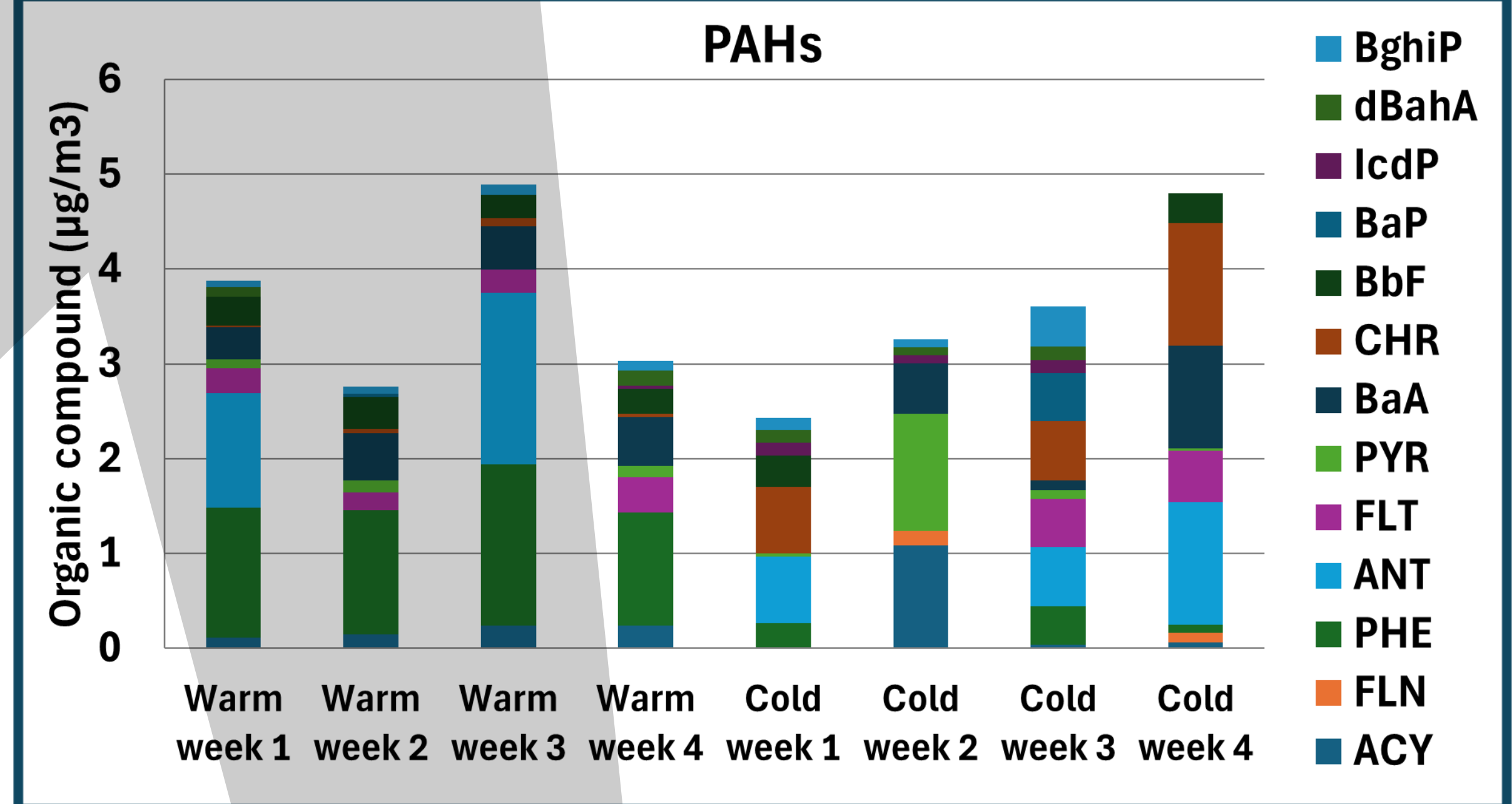
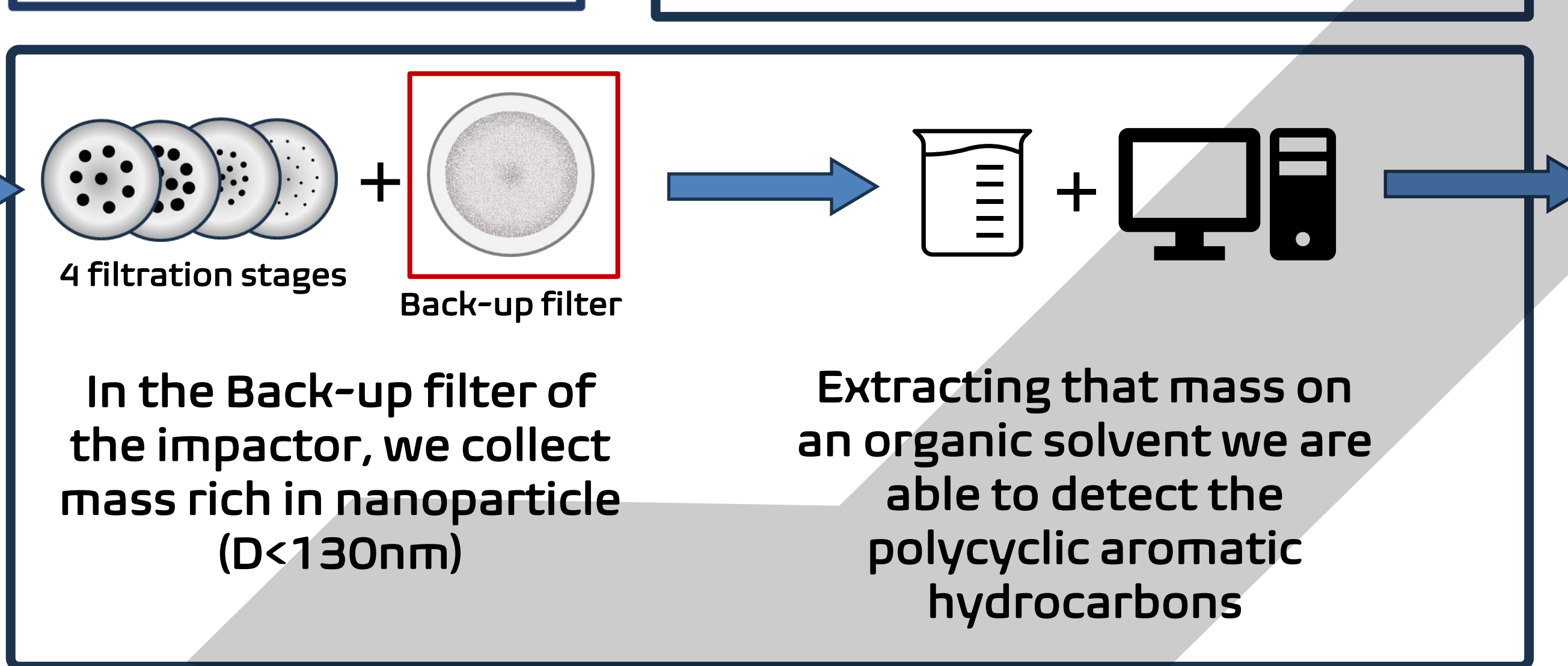


Humidity Temperature

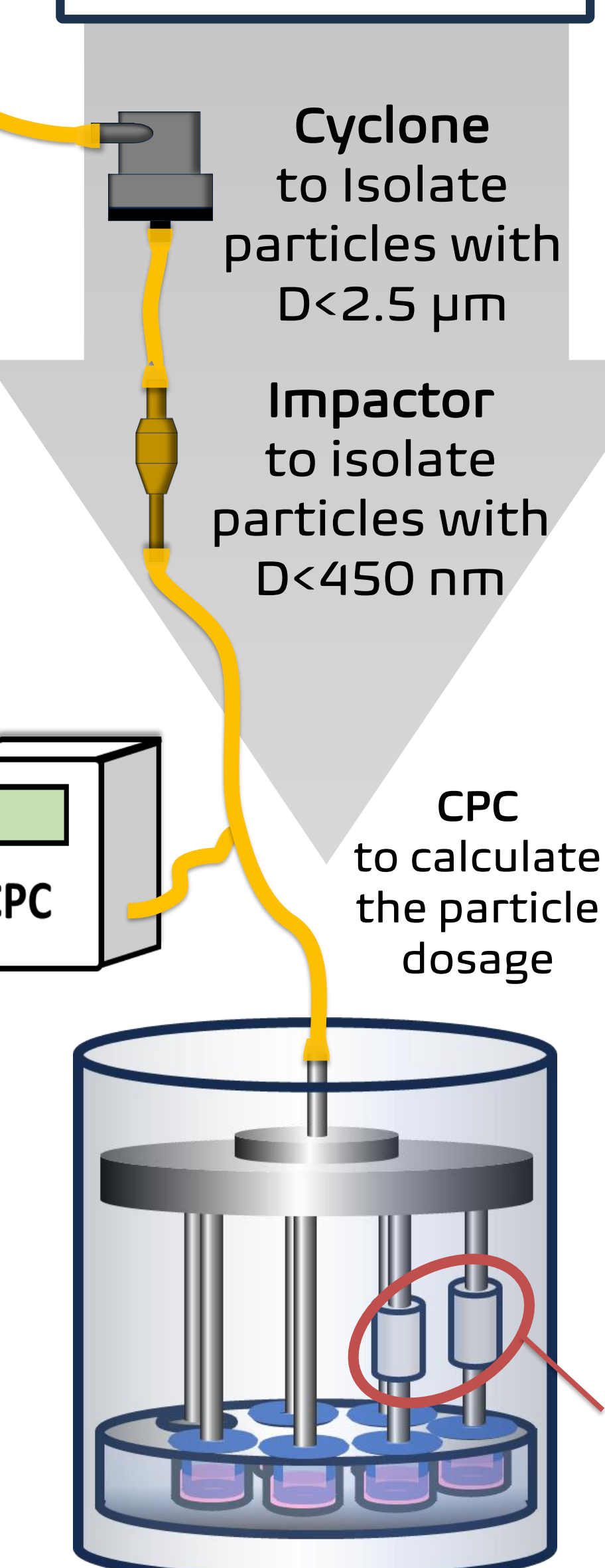
	(%RH)	(C)
Cold	72.6	12.9
Warm	74.5	16.8



Chemical Analysis



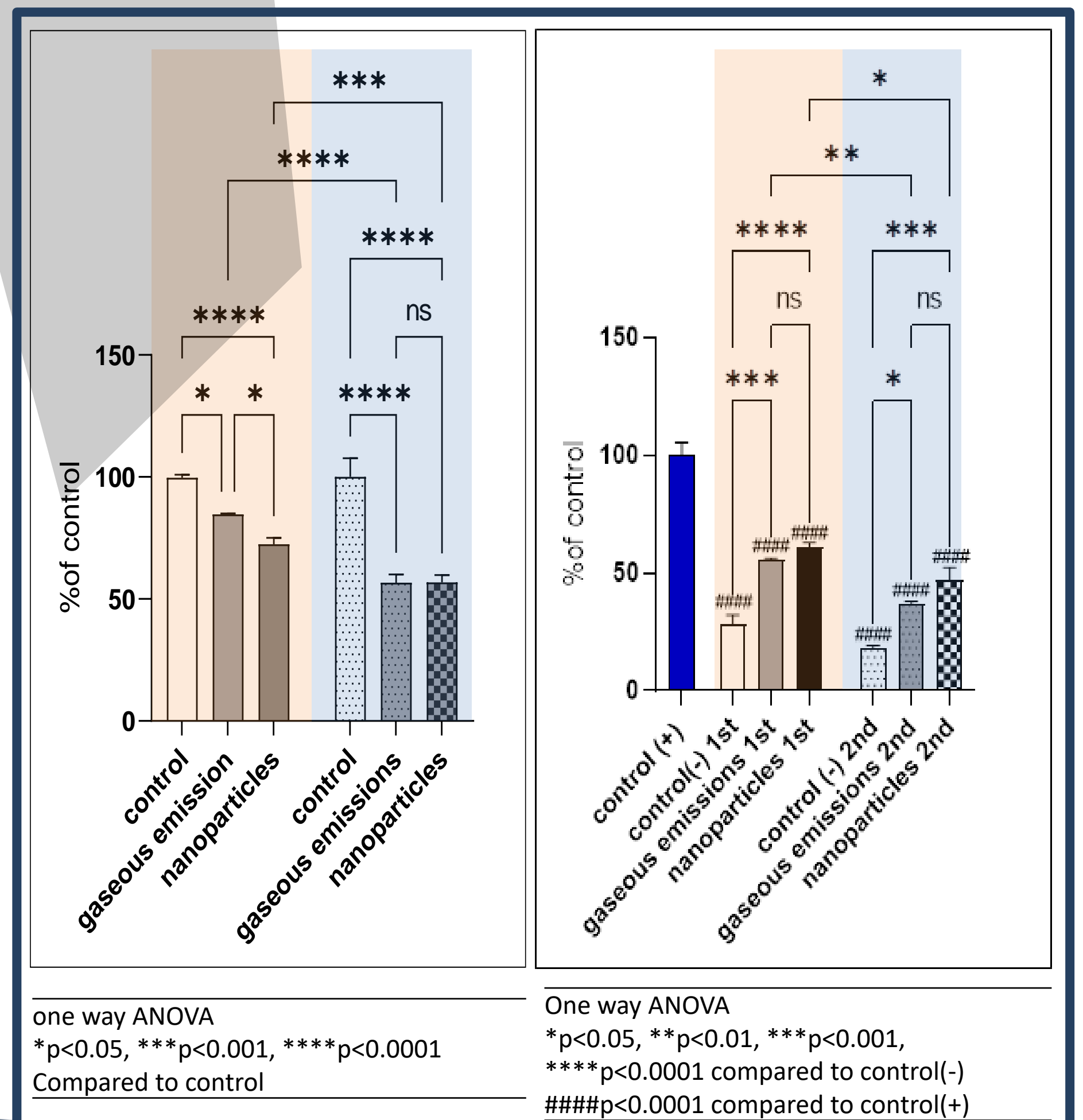
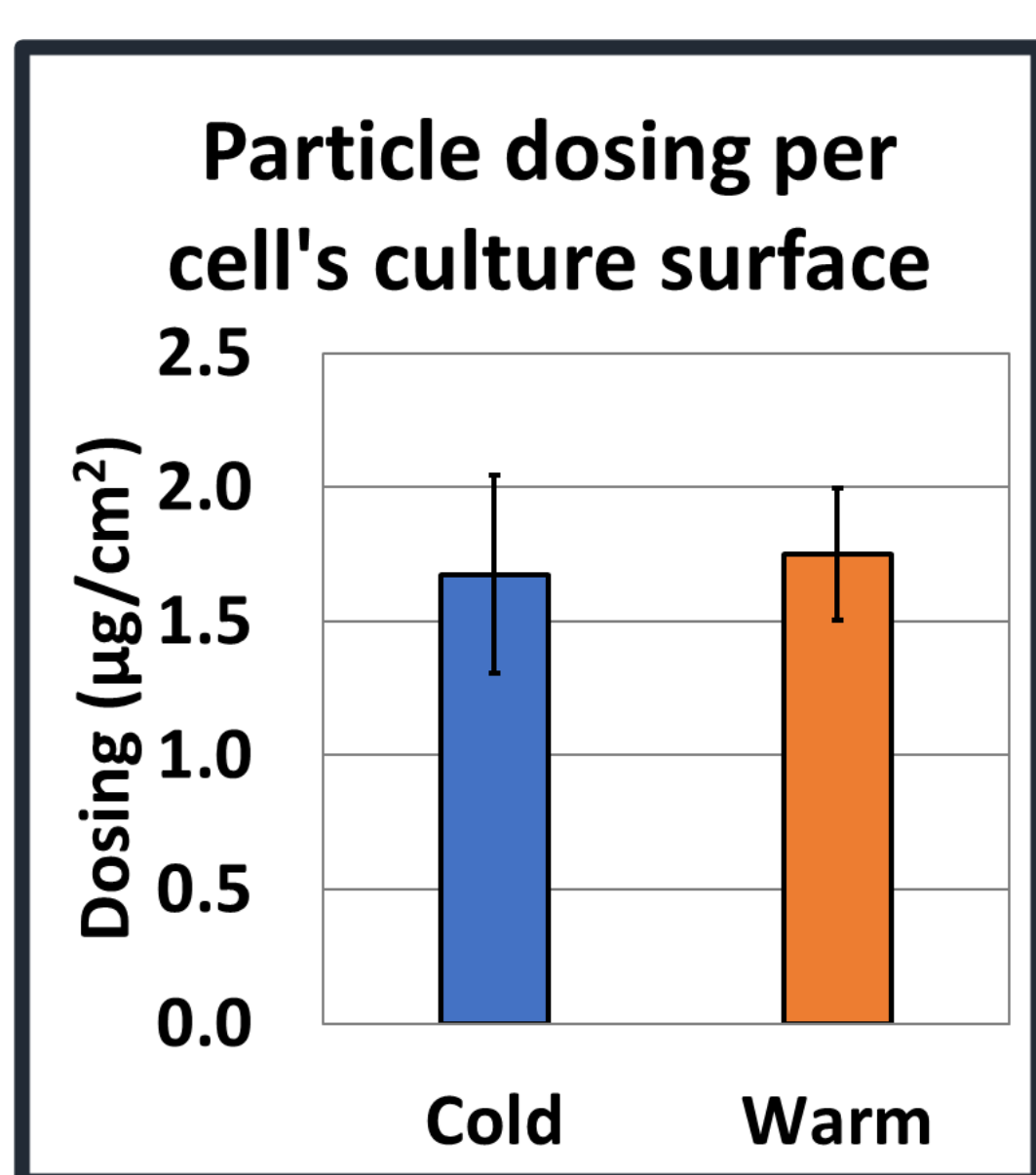
Toxicological Evaluation



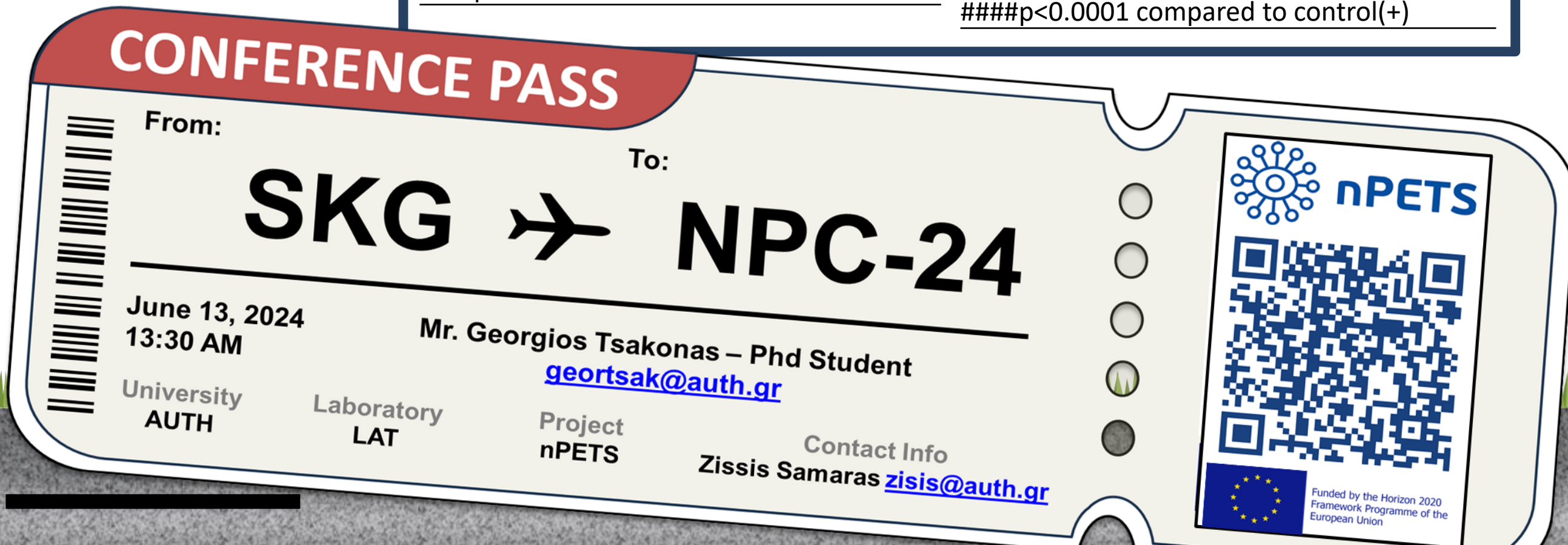
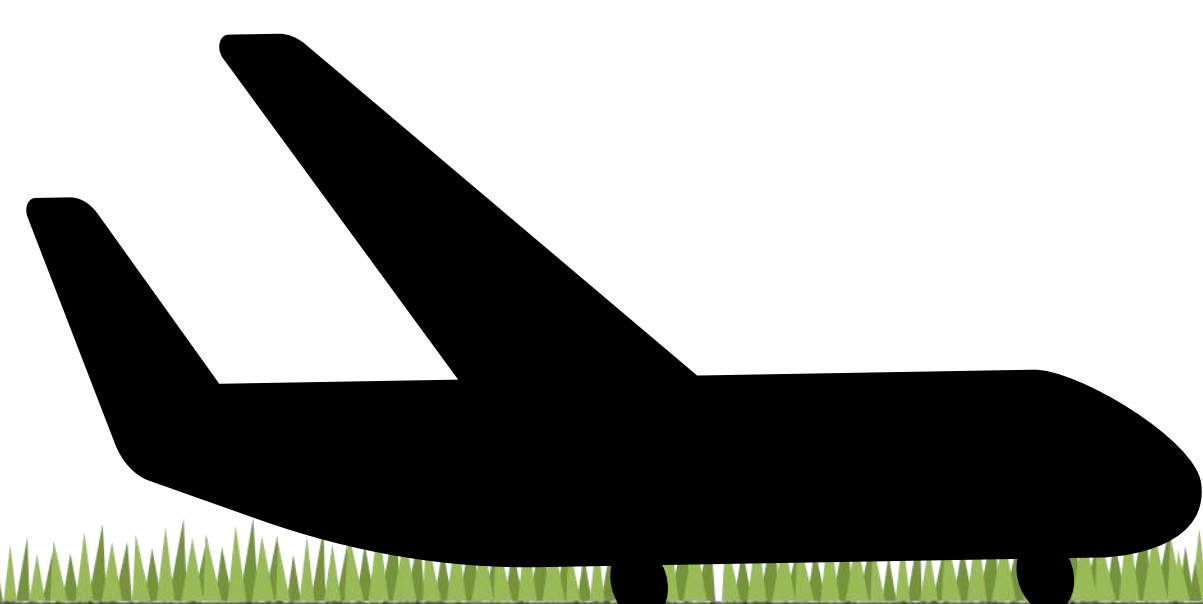
Inserts' Preparation: Cells cultured to 80% confluency. Recultivated in 6-well plate inserts (Falcon) at 2×10^5 cells/well.
Incubation: Incubated for 24 hours at 37°C with 5% CO₂ in DMEM-High glucose with 10% FBS, 5% PS (100 U/ml, 100 µg/ml), and 1 mM Sodium pyruvate (complete medium).

Results - Key Findings

1. The physical and chemical characteristics demonstrate season variations
2. During the Cold period VOCs with higher molecular weight were observed
3. Airport nanoparticles reduce cell viability and can lead to cell death, implying possible harmful effects on human health



Air Liquid Interface system (ALI)
For real-time cell exposure



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