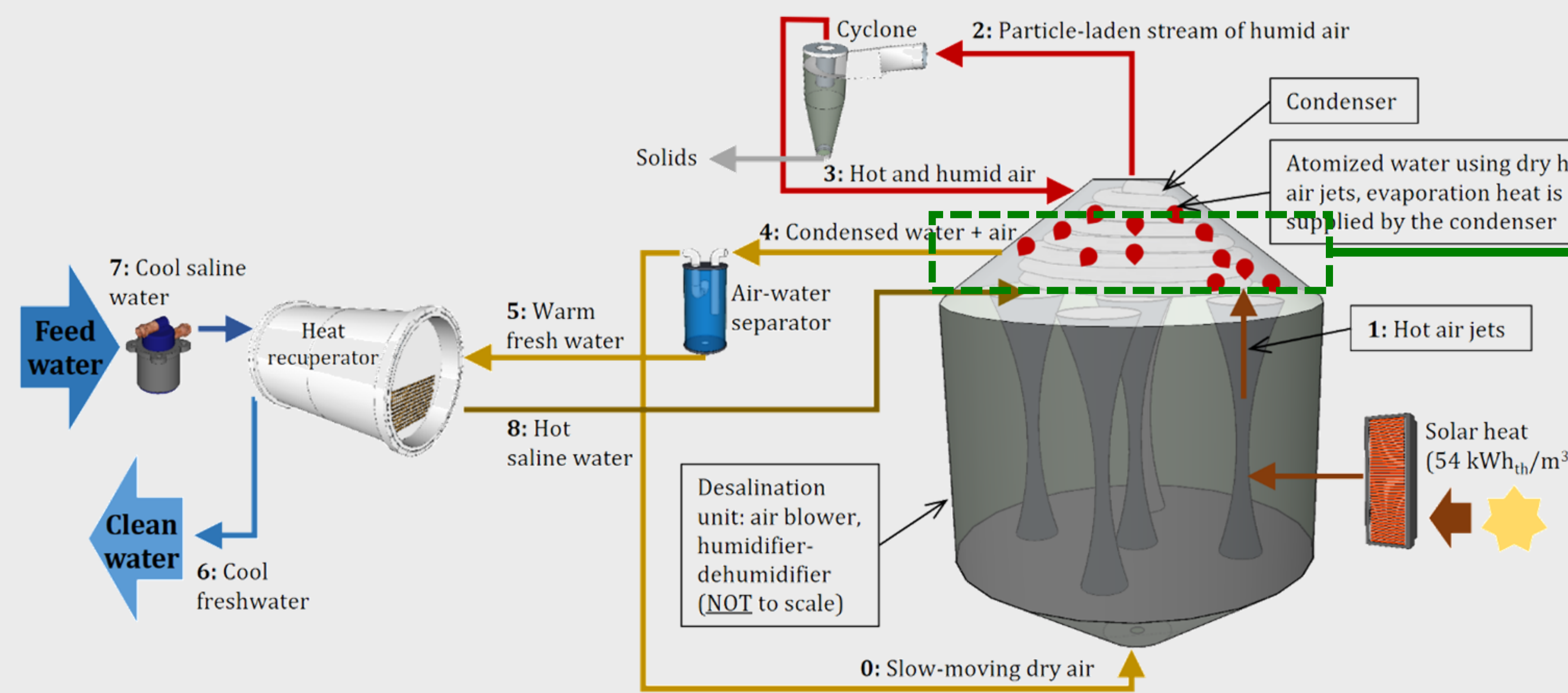


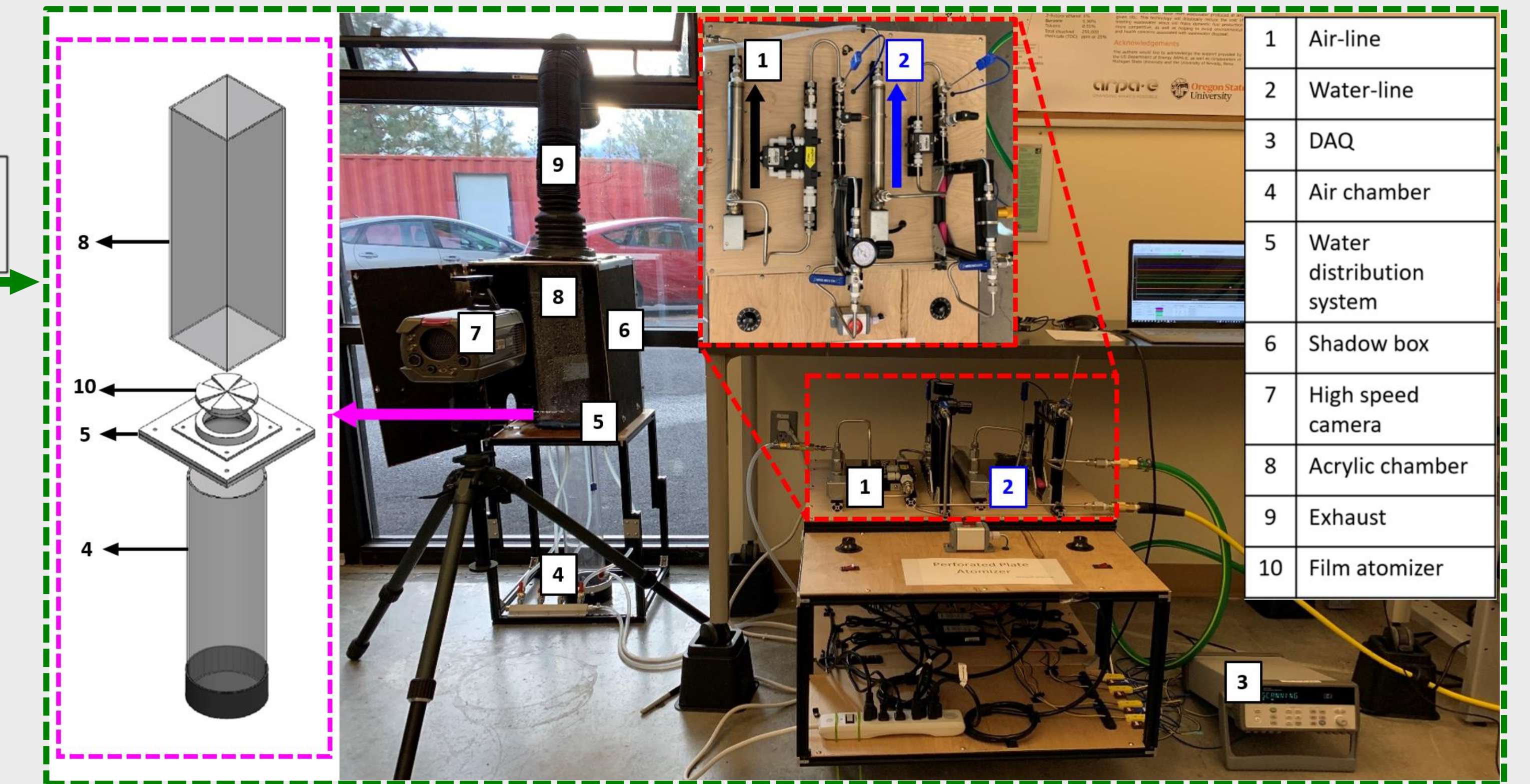
FILM ATOMIZER WITH SUPPRESSED CLOGGING

Deepak Sharma, Mohammed A. Elhashimi, Durga Prasad Ghosh, Sandra Jean Dennis, Jordan Neal Rote, Xiang Zhang, Bahman Abbasi

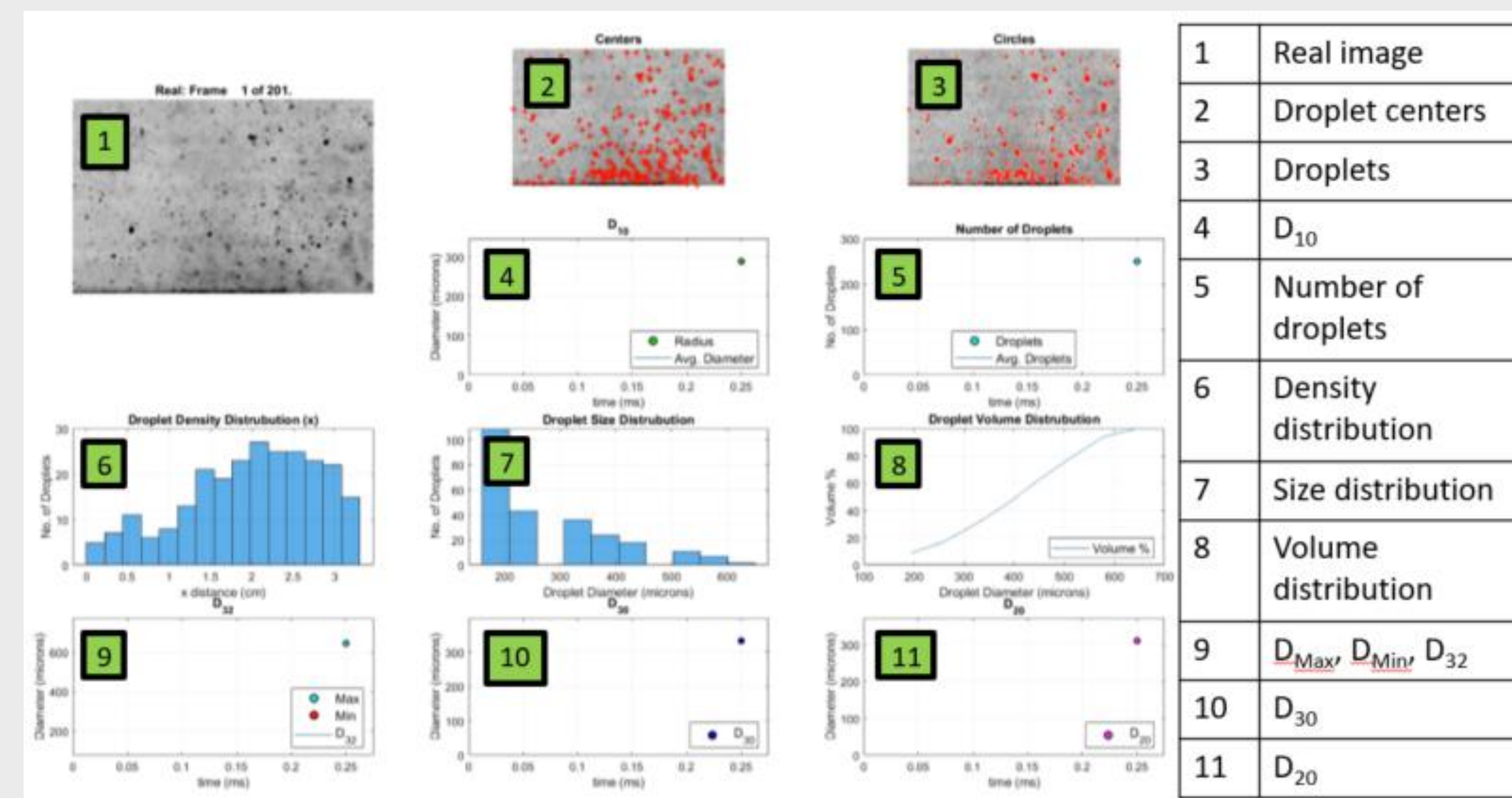
DESALINATION PROCESS SCHEMATIC



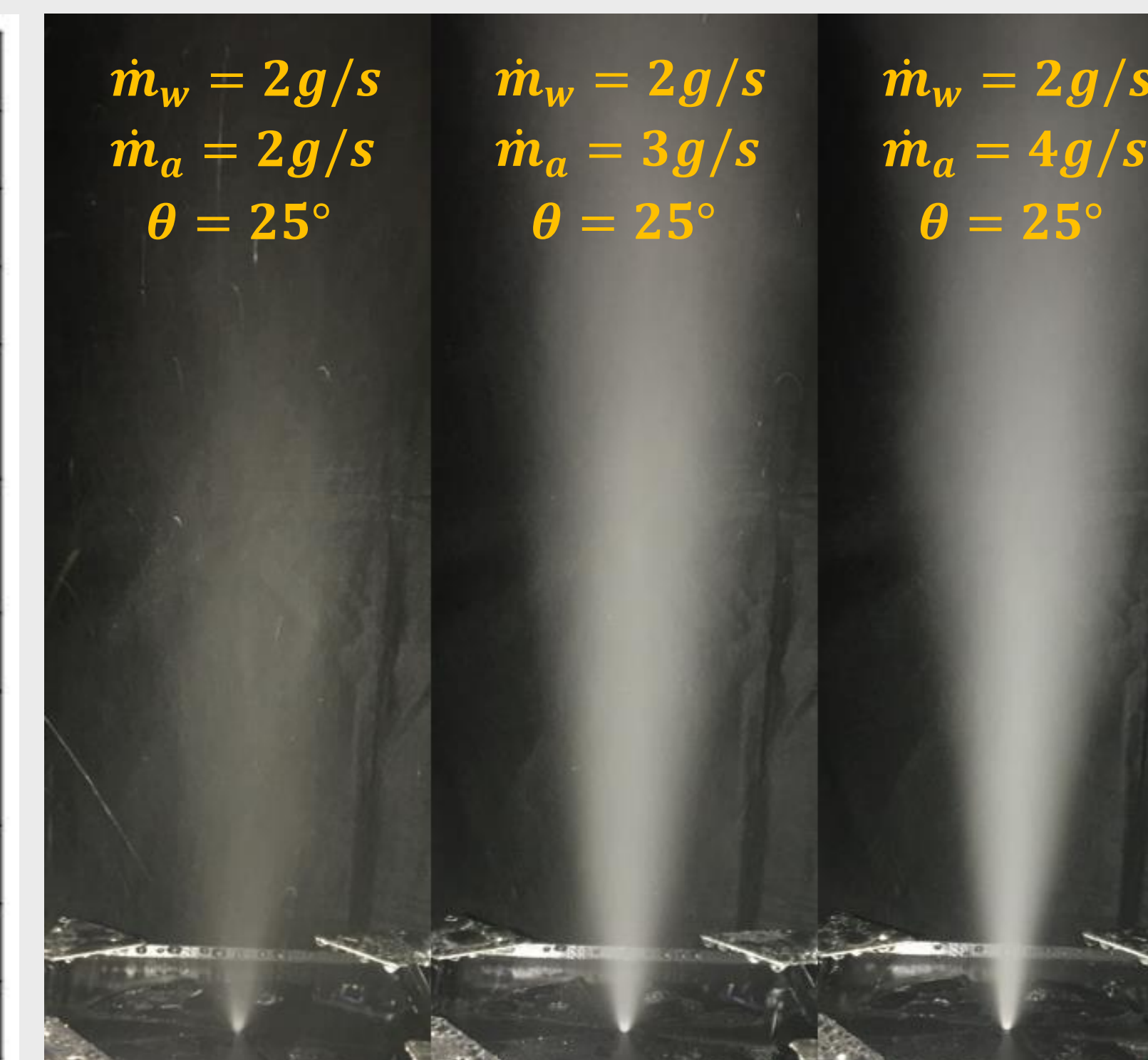
FILM ATOMIZER EXPERIMENTAL SETUP



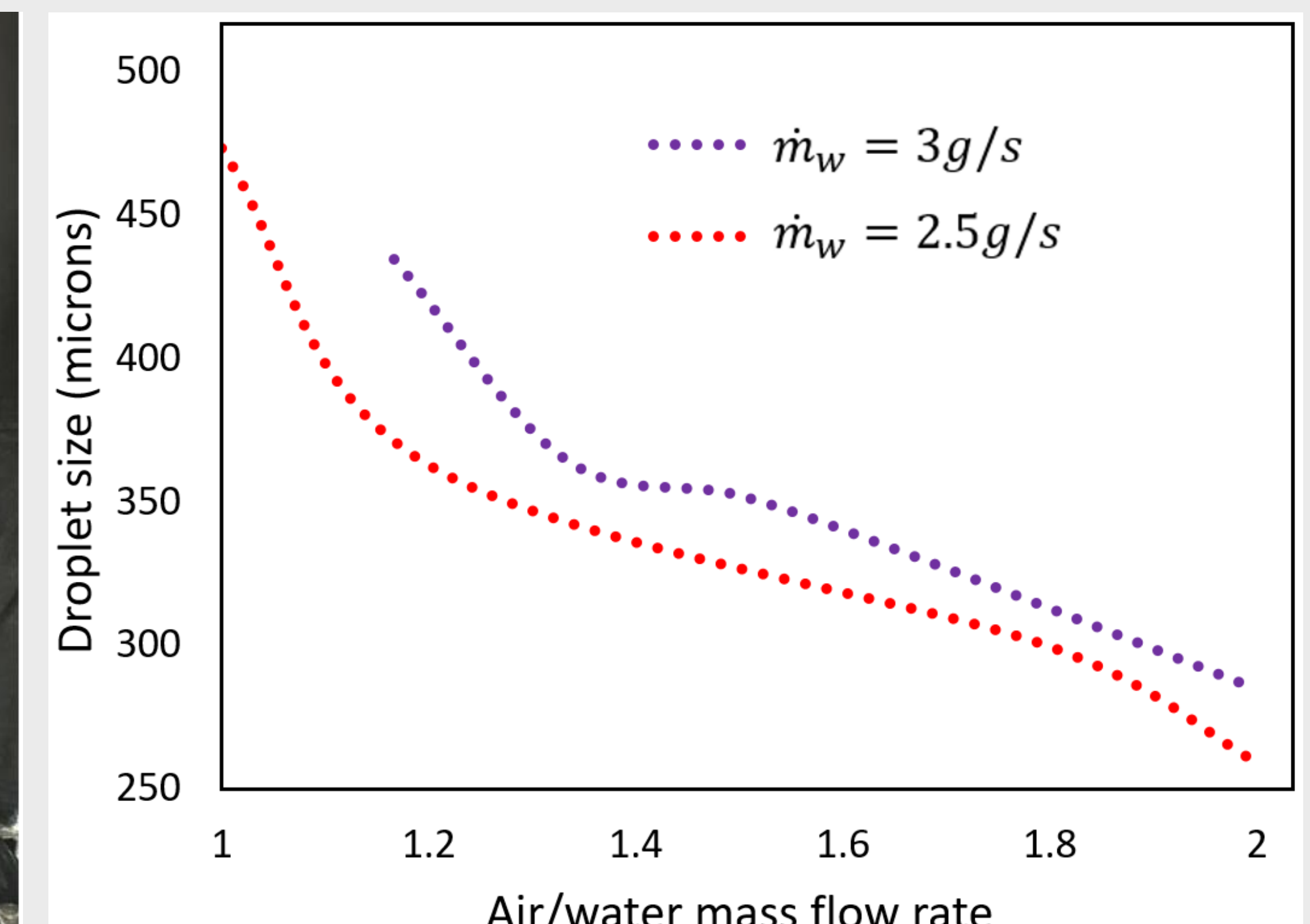
ATOMIZER CHARACTERIZATION



MATLAB video processing

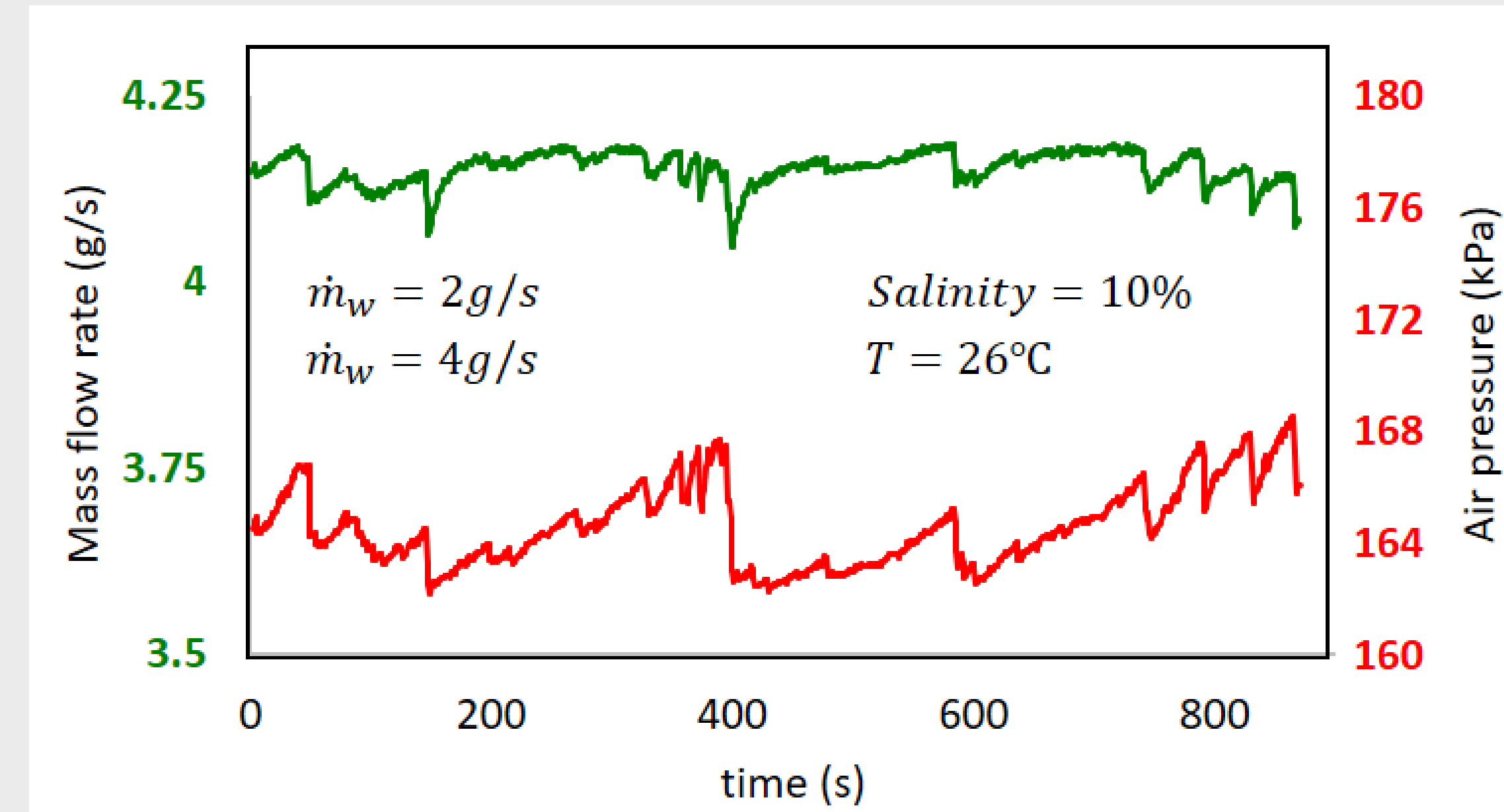


Spray cone angle

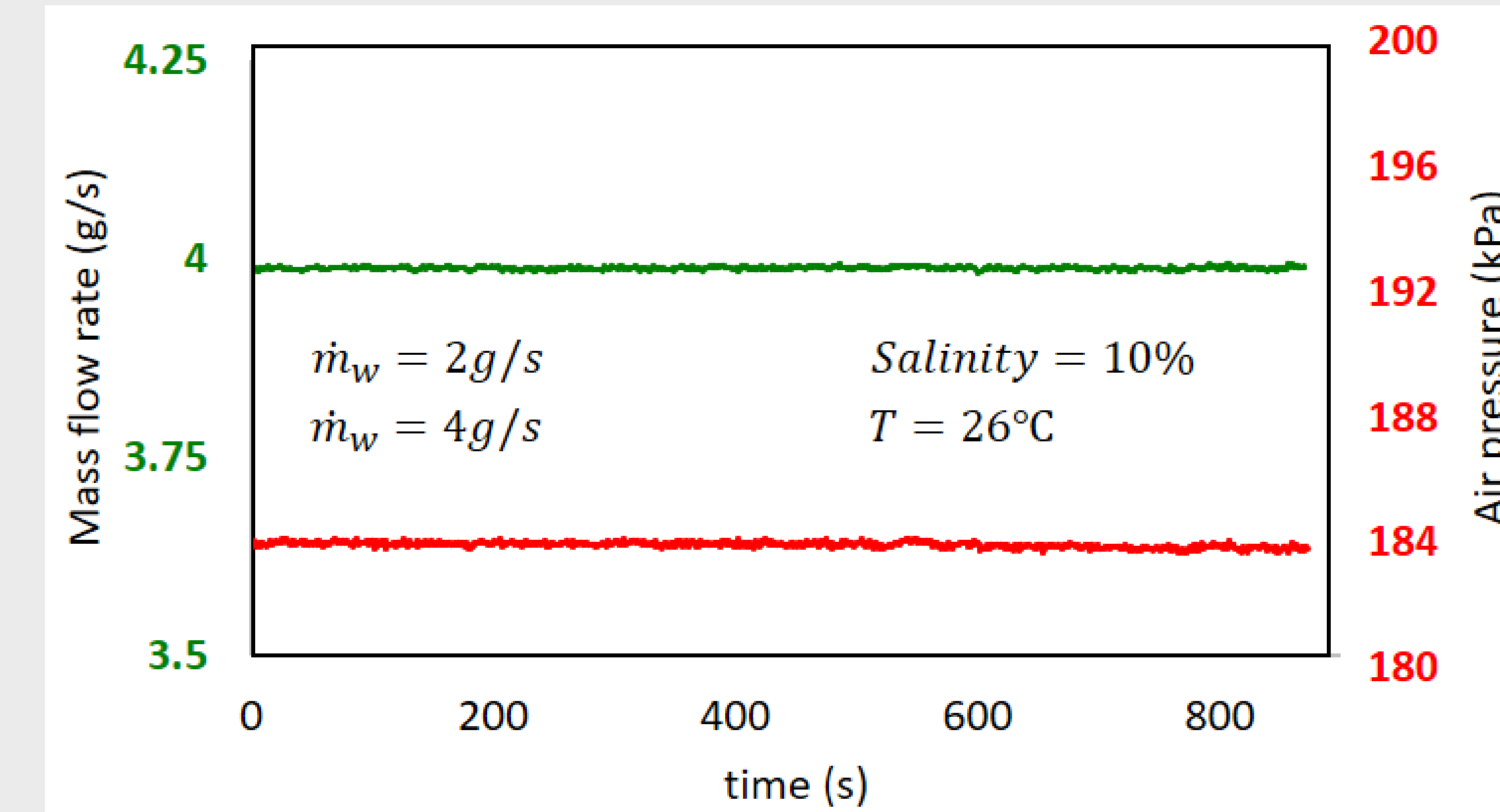


Droplet size

FOULING TEST



Conventional atomizer



Film atomizer

CONCLUSIONS

- This is an air-blast atomizer with a solid cone spray, whose cone angle was constant for different air mass flow rates
- Droplet size reduced for smaller water mass flow rate and for larger air flow
- This atomizer demonstrated reduced fouling in comparison with conventional air-blast atomizer
- This requires larger pressure due to sudden contraction in air pipe
- Future work should focus on testing the atomizer at higher operating temperatures

ATOMIZER FOR ZERO LIQUID DISCHARGE WATER DESALINATION

WATER STRESS

- NIDIS: in July 2020, 74% of Oregon's population was in drought
- NIDIS: in Sept 2018, 93% of Oregon was in drought
- EPA: In Oct 2015, 68% of Oregon was experiencing severe drought

Increasing water stress is a global problem, being severe with time and forcing existing desalination techniques to improvise.

DESALINATION TECHNOLOGIES

- Sophisticated water desalination systems to process large quantities of water such as given below relying on evaporation or distillation principle utilize saline spray:
 - Multi-effect distillation (MED)
 - Humidification-dehumidification (HDH)
 - vapor compression (VC) etc.
- Fouling in atomizers causes high maintenance cost, low durability, reduced operating hours and temperature of the plant
- Fouling causes unstable spray quality, and thus, deteriorates the plant performance

