Supplementary materials

to article “Solar-driven desalination using nanoparticles”

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Flow meter calibration

Figure S.1 shows the calibration curve of the Aqua-computer Flow Sensor MPS Flow 100.

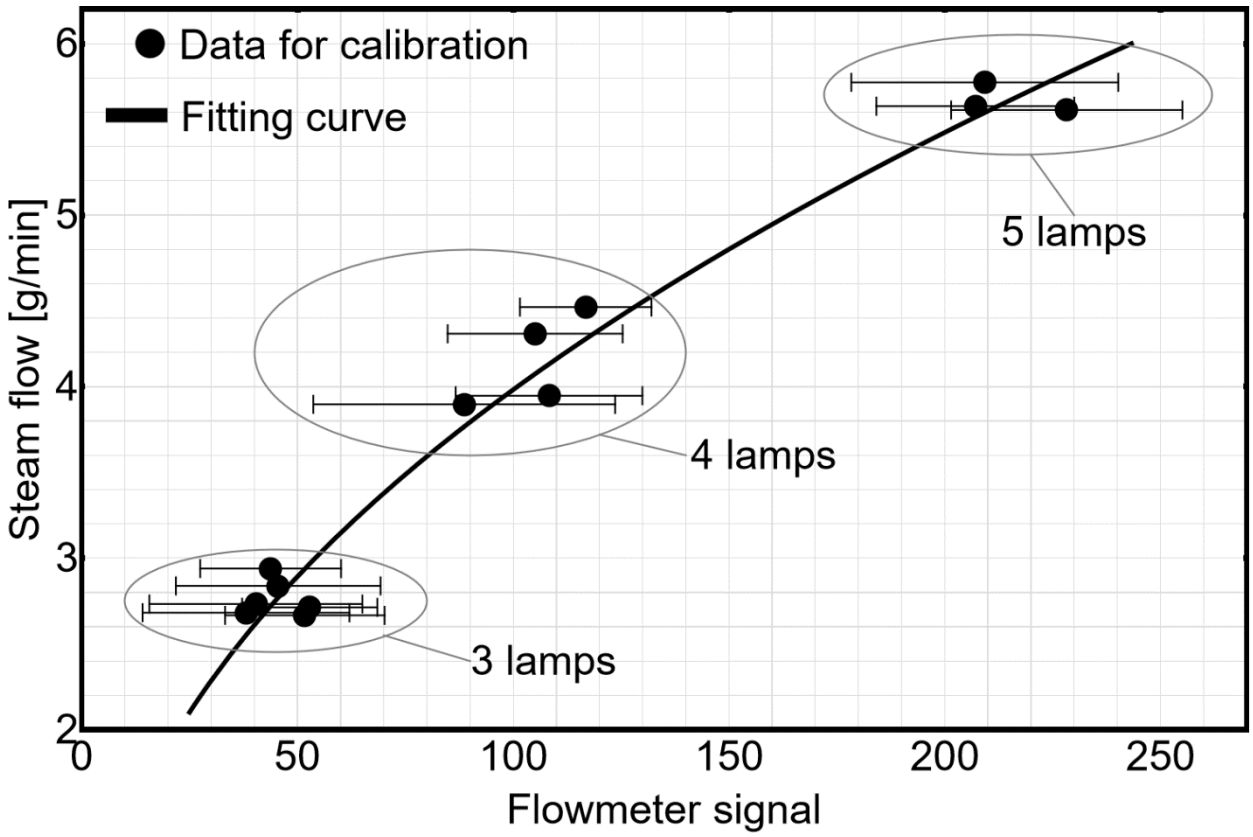

Figure S1. Calibration of the flow meter. The mass steam flow is shown as a function of the flow meter dimensionless signal.

The experimental data for the flow meter calibration were obtained using the same experimental rig. For the experiments, we used degassed water without the addition of salt and nanoparticles. We varied the number of lamps illuminating the blackened flask filled with degassed water to change the steam flow, as shown in Figure 1.

The calibration measurements were performed at the steady operation of the experimental set-up. The flowmeter signal was recorded for at least 3 minutes during the steady operation using the Aquasuite software supplied with the flow meter. The frequency of recording the signal was 1 Hz. The recorded signal was in dimensionless units and proportional to the pressure drop in the sensor.

When recording the flowmeter signal, the condensate of the steam generated in the flask was collected and weighted using the precision scale FC-50. Thus, the steam flow as a function of the dimensionless signal was obtained. Fitting these data with a power-law function, we derived the expression for steam flow:

$$G = 0.477 s^{0.46} \tag{S.1}$$

where G is the steam flow; and s is the flowmeter signal.

The instrument error of the scale gives the error of measuring the condensate mass. The flow meter error was obtained as the statistical error of the signal recorded during the measurements.

Flowmeter signal processing

An example of the flow meter signal as a function of time is shown in Figure S.2. Note that initial times for the data in Figure S.2 were chosen arbitrarily to provide a better overview of the signal processing. These initial times do not affect the steam flow and are determined by the start of recording the flow meter signal.

To determine the steam flow, a time interval of at least 3 min duration was selected corresponding to the steady-state operation of the set-up. Then, the mean value of the flow meter signal in this interval and the corresponding standard deviation were calculated. Finally, the steam flow was calculated by substituting the mean flowmeter signal into Eq. (S.1).

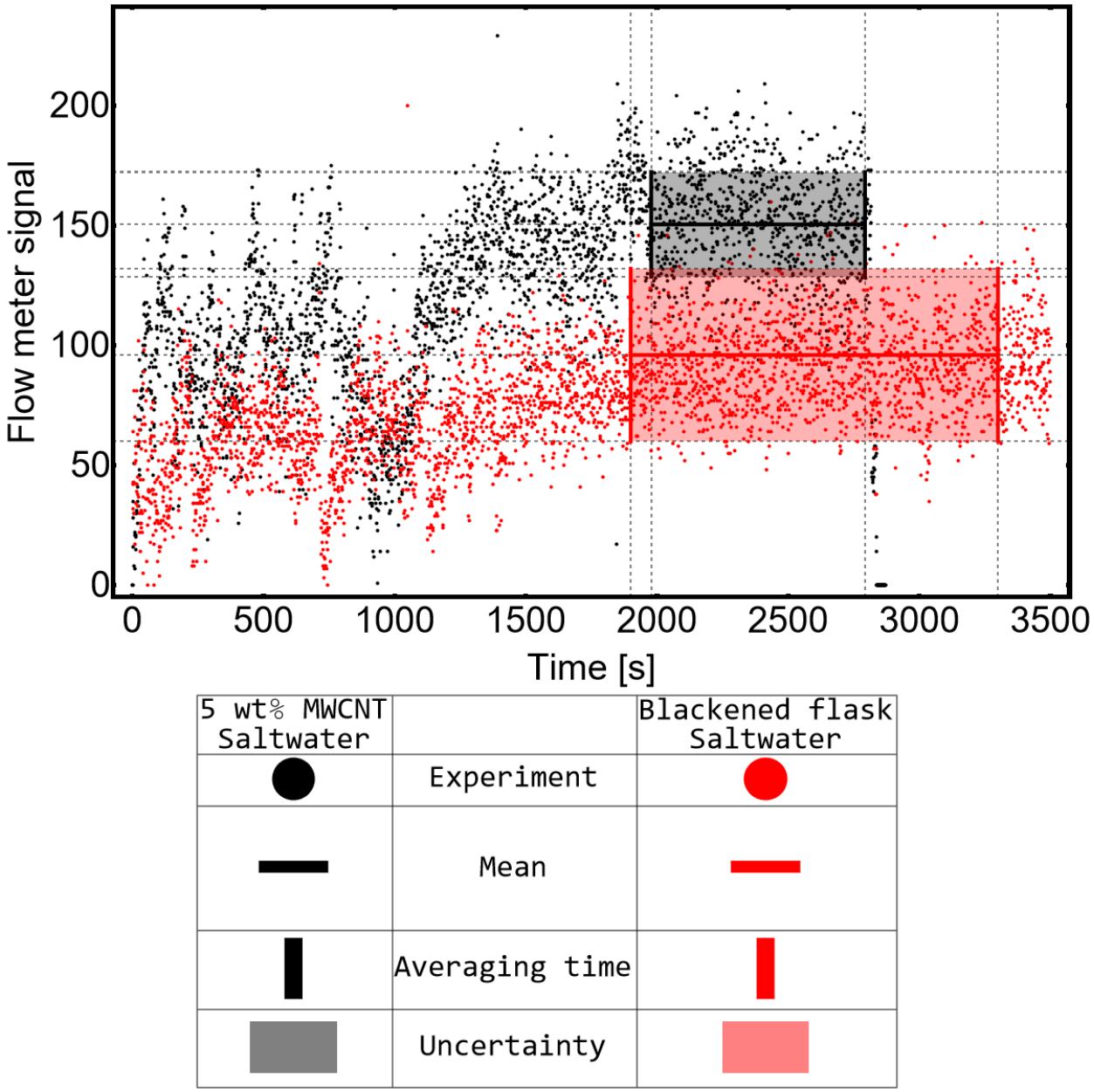

Figure S2. Flowmeter signal as a function of time for the suspension with addition of 5 wt% MWCNT (black dots) and for saltwater in the blackened flask (red dots)