Nomenclature

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|  | radius of micropillar [µm] |
|  | radius of water/substrate layer in one unit cell [µm] |
|  | specific heat capacity of silicon [J/(kg K)] |
|  | saturated vapor concentration [kg/m3] |
|  | specific heat capacity of water [J/(kg K)] |
|  | diameter of micropillar [µm] |
|  | coefficient of vapor diffusion [m2/s] |
|  | coefficient of effective conductivity |
|  | height of micropillar [µm] |
|  | convection heat transfer coefficient of air [W/(m2 K)] |
|  | latent heat of water [kJ/kg] |
|  | local evaporation flux [kg/(m2 s)] |
|  | effective conductivity of water [W/(m K)] |
|  | thermal conductivity of silicon [W/(m K)] |
|  | thermal conductivity of water [W/(m K)] |
|  | thickness of silicon substrate [µm] |
|  | thickness of water layer [µm] |
|  | number of water layer control volume |
|  | number of micropillar under the droplet |
|  | order of Bessile function |
|  | periodicity of substrate [µm] |
|  | heat transfer rate from droplet base in one unit cell [W] |
|  | convective heat transfer rate [W] |
|  | evaporation heat transfer rate from droplet cap surface [W] |
|  | evaporation heat transfer rate of water droplet [W] |
|  | heat transfer rate in the water layer control volume [W] |
|  | heat transfer rate in one unit cell [W] |
|  | radiative heat transfer rate [W] |
|  | heat transfer rate from droplet base [W] |
|  | heat transfer rate for droplet temperature increase [W] |
|  | heat transfer rate in the water layer in one unit cell [W] |
|  | relative humidity |
|  | thermal resistance of water layer [K/W] |
|  | thermal resistance of substrate [K/W] |
|  | radius of water droplet [µm] |
|  | radius of spherical cap droplet [µm] |
|  | surface of spherical cap [µm2] |
|  | average temperature of droplet base [K] |
|  | average temperature of solid-liquid interface [K] |
|  | contact temperature at the solid-liquid interface [K] |
|  | temperature of droplet cap surface [K] |
|  | droplet surface temperature tested by the IR camera |
|  | temperature of control volume water layer [K] |
|  | lab ambient temperature [K] |
|  | average temperature calculated by the thermal circuit model [K] |
|  | initial temperature of droplet base [K] |
|  | top surface temperature of micropillar [K] |
|  | uniform temperature of water layer in one unit cell [K] |
|  | ambient temperature [K] |
|  | volume of water droplet |
| Greek symbols |  |
| *α* | root of Bessel function |
| *ε* | emissivity of water |
| *θ* | contact angle of water droplet [°] |
| *ρ* | density [kg/m3] |
| *σ* | Stefan-Boltzmann constant [kg/(s3 K4)] |
| *τ* | nondimensional evaporation time |
| *φ* | evaporation ratio |
| Abbreviations |  |
| CCA | constant contact angle |
| CCR | constant contact radius |
| DI | deionized |
| IR | infrared |
| SEM | scanning electron microscope |