Appendix A. Correction of Solvent Balances for Water Evaporation during Pumping

The solvent material balances were corrected for water evaporation during the pumping period by first calculating the dew point temperature of the air above the solvent pool as a function of relative humidity and dry bulb temperature using the Magnus-Tetens algorithm:

$$T_d = \frac{b\alpha(T, RH)}{a - \alpha(T, RH)} \tag{1}$$

$$\alpha(T, RH) = \frac{aT}{b + T} + \ln(RH) \tag{2}$$

where a and b are 17.27 and 237.7 °C, respectively, T is the measured dry bulb temperature from 0–60 °C, and RH is the measured relative humidity from 0.01–1.00.

The solvent's vapor pressures at the dew point and saturation temperatures are calculated using Antoine's equation:

$$\ln\left(P^{sat}\right) = A - \frac{B}{T + C} \tag{3}$$

where A, B, and C are predefined, component-specific parameters. Because the dissolved microsphere concentration is less than 10% solids, the suspension is considered sufficiently dilute to use the predefined parameters for pure water.

The evaporation rate at the pool surface is calculated as a function of vapor pressure, latent heat of vaporization, and local air velocity:

$$W = \frac{3600}{H_v}\left(P_w - P_a\right)\left(0.089 + 0.0782V\right) \tag{4}$$

where P_w is the vapor pressure at the saturation temperature, P_a is vapor pressure at the dew point temperature, V is the air velocity at the water surface, and H_v is latent heat of vaporization at the satiation temperature. Air velocity is assumed negligible because (1) the analytical balance's doors remained closed and (2) the relative difference in the pool and ambient temperatures is too small to generate convective motion.

Once the evaporation rate at the pool's surface is known, the volume of evaporated solvent is calculated using a macroscopic material balance:

$$N_e = -\frac{\rho}{S}\left(\frac{dV}{dt}\right) \tag{5}$$

where p is the density of the coating suspension, S is the available surface area for evaporation, V is the droplet volume, and t is the available time for evaporation. We assume the available surface area for evaporation, S, is 5% of the total dish area because the collected pool of water is thin and only covers a small portion of the weigh dish. If S is assumed to be 10% of the total dish area or larger, the volume of evaporated solvent actually exceeds the total volume of water supplied to the delivery system during the pumping period.

Appendix B. Water Evaporation Rates

Evaporation rates were calculated for five relative humidities between 35% and 70% to determine if variations in relative humidity significantly affect the evaporative flux. The evaporative rate is calculated as a function of droplet volume (and relative humidity) using a macroscopic material balance:

$$N_e = -\frac{\rho}{S}\left(\frac{dV}{dt}\right) \tag{6}$$

where *p* is the density of the coating suspension, *S* is the available surface area for evaporation, *V* is the droplet volume, and *t* is the available time for evaporation. The average rate for each relative humidity is reported in Table S1. All rates were analyzed as paired data sets, grouped by relative humidity, at the 95% confidence level using the Independent Samples *t*-Tests algorithm in the SPSS 17 statistics software package (IBM, Armonk, NY, USA). The results of these *t*-Tests are reported in Table S2.

Table S1. Statistical Significance of Variation in Solvent Evaporation Rate (N_e) at 95% Confidence Level.

Relative Humidity	Sample Size (n_1, n_2)	Statistical Significance (p value)
35%, 40%	(9, 6)	0.363
35%, 50%	(9, 6)	0.155
35%, 60%	(9, 6)	0.041
35%, 70%	(9, 6)	0.001
40%, 50%	(6, 6)	0.363
40%, 60%	(6, 6)	0.363
40%, 70%	(6, 6)	0.363
50%, 60%	(6, 6)	0.000
60%, 70%	(6, 6)	0.193

Table S2. Average Evaporation Rates.

Relative Humidity	Evaporation Rate ($g/mm^2/min$)
35%	$1.13 \times 10^{-5} \pm 2.15 \times 10^{-6}$
40%	$9.03 \times 10^{-6} \pm 1.49 \times 10^{-6}$
50%	$9.77 \times 10^{-6} \pm 5.33 \times 10^{-7}$
60%	$9.28 \times 10^{-6} \pm 4.42 \times 10^{-6}$
70%	$5.41 \times 10^{-6} \pm 1.13 \times 10^{-6}$