Use of a Routh-Russel Deformation Map to Achieve Film Formation of a Latex with a High Glass Transition Temperature

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Calculation of *Pe* and $\bar{\lambda}$

$$Pe = \frac{6\pi \mu R_0 H \dot{E}}{kT} \qquad \bar{\lambda} = \frac{\eta_0 R_0 \dot{E}}{\gamma_{wa} H}$$

$$\eta_0 = 6.5 \cdot 10^{10} exp\left[\frac{-34(T-T_g)}{80+T-T_g}\right]$$

Constant parameters in all the experiments:

R_0: 72.5 nm = 7.25 x 10^{-8} m k : 1.38 x 10^{-23} J K^{-1} γ_{wa}: 72.8 mN/m=0.0728 N m^{-1}
μ: 1.002 ×10^{-3} Pa·s

Latex with T_g of 55 °C (328 K)

Experiment Code	Power of IR emitter (W)	Power density (mW cm^{-2})	Initial film thickness, H x 10^4 (m)	Characteristic temperature (K)	η_0 (Pa·s)	$\dot{E}$ x 10^7 (m/s)	Pe	$\bar{\lambda}$
A	1200	25 ± 4	5.0	327	1.00 × 10^{11}	4.39	67	86
B	800	6 ± 0.03		321	1.31 × 10^{12}	3.24	51	839
C	1200	25 ± 4	3.8	326	1.55 × 10^{11}	4.91	57	200
D	800	6 ± 0.03		318	8.36 × 10^{12}	2.23	26	4885
E	2400	160 ± 7	2.5	341	5.61 × 10^{8}	6.99	51	2
F	1800	67 ± 6		332	1.29 × 10^{10}	5.91	45	30
G	1200	25 ± 4		324	3.29 × 10^{11}	4.22	33	536

Latex with T_g of 45 °C (318 K)

Power of the IR emitter (W)	Power density (mW cm^{-2})	Initial wet film thickness, H x 10^4 (m)	Characteristic temperature (K)	η_0 (Pa·s)	$\dot{E}$ x 10^7 (m/s)	Pe	$\bar{\lambda}$
1000	13 ± 4	5.0	325	4.22 × 10^{9}	4.80	74	4
800	6 ± 0.03		320	2.84 × 10^{10}	3.78	59	21

Latex with T_g of 64 °C (337 K)

Power of the IR emitter (W)	Power density (mW cm^{-2})	Initial wet film thickness, H x 10^4 (m)	Characteristic temperature (K)	η_0 (Pa·s)	$\dot{E}$ x 10^7 (m/s)	Pe	$\bar{\lambda}$
2800	217 ± 0.2	2.5	341	1.29 × 10^{10}	11.0	81	56
2400	160 ± 7		337	6.50 × 10^{10}	8.80	66	225
2000	95 ± 0.2		336	1.00 × 10^{10}	8.41	63	331