Electronic Supplementary Material (ESI) for Soft Matter.

Supplementary Information:

The Rheologically-Complex Fluid Beauty of Nail Lacquer Formulations

Leidy Nallely Jimenez, Carina D. V. Martínez Narváez, Chenxian Xu, Samantha Bacchi, and Vivek Sharma*, Department of Chemical Engineering, University of Illinois at Chicago, IL, 60608, USA.

*Correspondence to: Vivek Sharma (E-mail: viveks@uic.edu)

Table S1. Power law model parameters extracted from analysis of the radius evolution plots using DoS rheometry.

Nail Lacquer Formulation	Power Law Model (DoS)		
	n [-]	t_f [s]	t_{PL} [s]
OPI Big Apple Red	0.70±0.091	2.3±0.054	1.4±0.089
OPI Nessie Plays Hide & Sea-k	0.61±0.031	2.7±0.23	1.3±0.11
OPI Closer Than You Might Belem	0.70±0.046	0.82±0.054	0.52±0.039
OPI Getting Nadi On My Honeymoon	0.71±0.13	0.83±0.091	0.49±0.13
CND Bloodline	0.62±0.042	0.64±0.081	1.1±0.24
CND Midnight Swim	0.38±0.0059	1.0±0.063	2.3±0.13
CND Lobster Roll	0.54±0.023	0.90±0.027	0.85±0.18
CND Married to Mauve	0.54±0.020	1.1±0.10	1.0±0.11
Essie Tart Deco	0.51±0.023	0.81±0.016	1.5±0.16
Essie Smokin Hot	0.48±0.039	1.3±0.17	3.0±0.41
Essie Mint Candy Apple	0.75±0.013	1.5±0.17	0.93±0.069
Essie Muchi Muchi	0.78±0.12	1.2±0.31	0.64±0.14

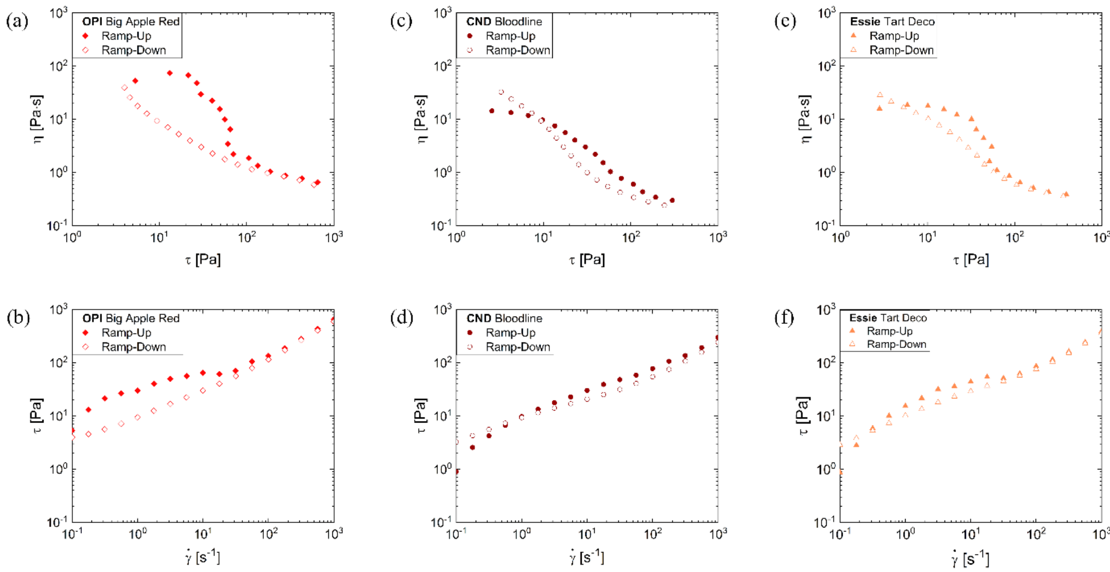

Figure S1. Apparent shear viscosity as a function of shear stress and shear stress *vs.* shear rate curves for three representative nail polishes for each brand. The thixotropy is higher for OPI formulation as compared to CND and Essie formulations. The OPI formulation has higher viscosity at any shear rate and at comparable applied stresses.

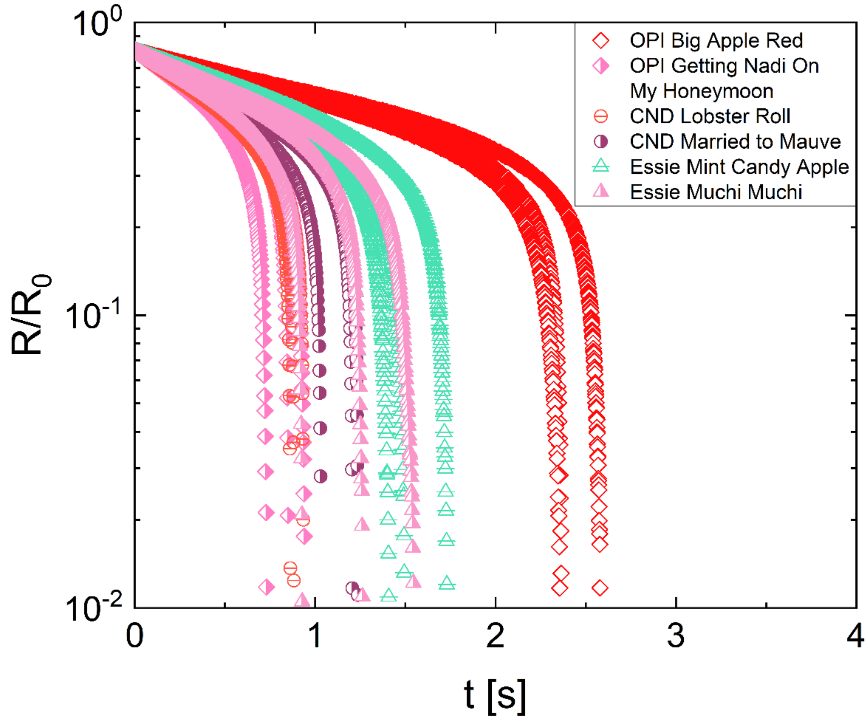

Figure S2. Radius evolution as a function of time for six nail polishes from OPI, CND, and Essie. Three trials are shown for variability for each different nail polish, with the same chosen starting point of $R / R_0 = 0.8$. The data shows similar power law behavior at the point before pinch-off.

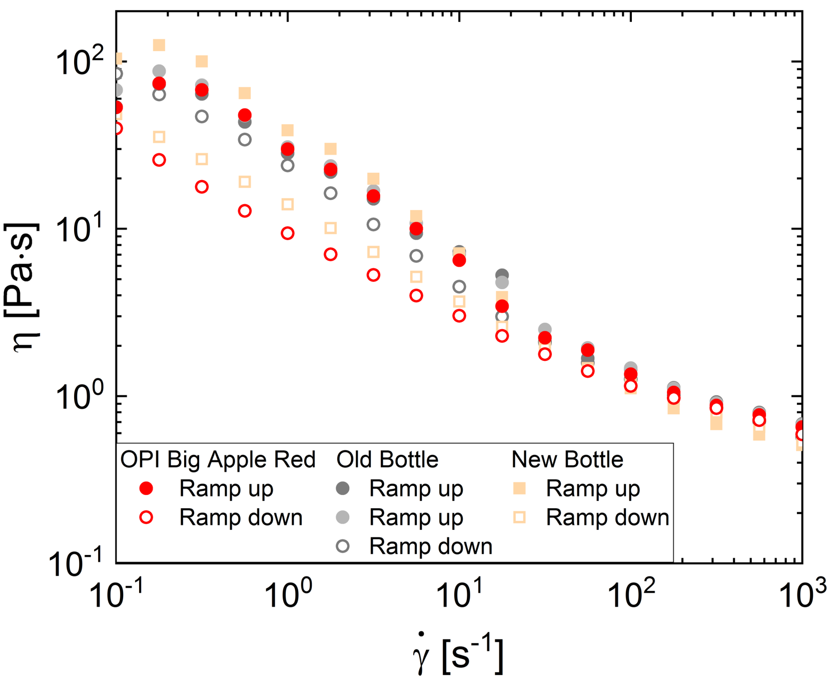

Figure S3. Apparent shear viscosity as a function of shear rate for OPI Big Apple Red. We include datasets from multiple experiments to illustrate the range of variability in these measurements. The old bottle datasets are for samples drawn from the same bottle as used for the highlighted measurement but carried out after a few months of storage. The new bottle datasets were acquired using samples drawn from a separate, freshly opened bottle.

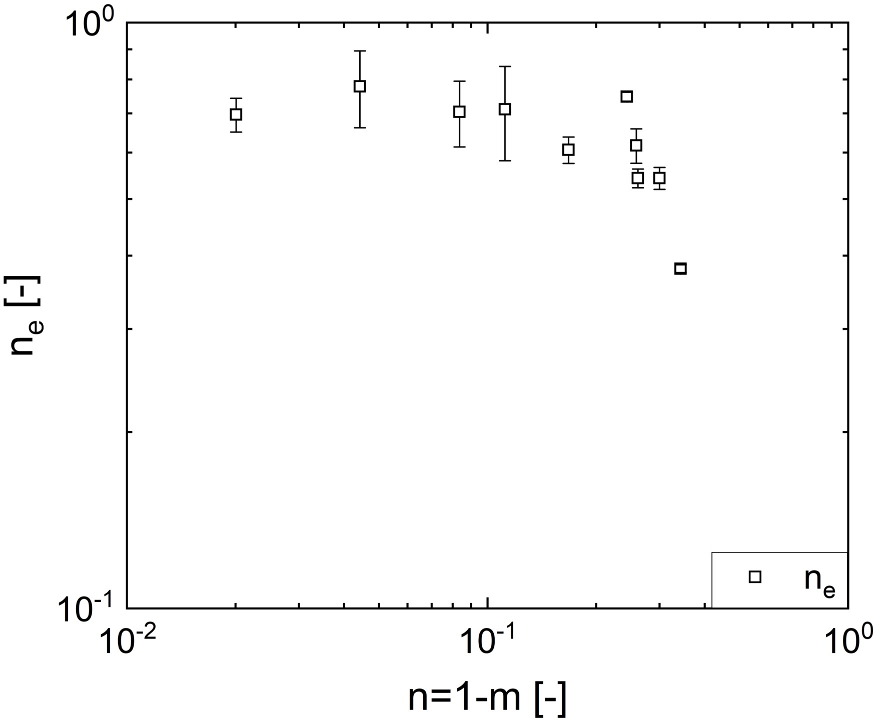

Figure S4: Extensional power law exponent, n_e extracted from the fits to radius evolution datasets plotted against the shear power law exponent, $n = 1 - m$, computed using the exponent, m obtained from the Cross model fits to the apparent shear viscosity *vs.* shear rate data acquired using torsional rheometry.

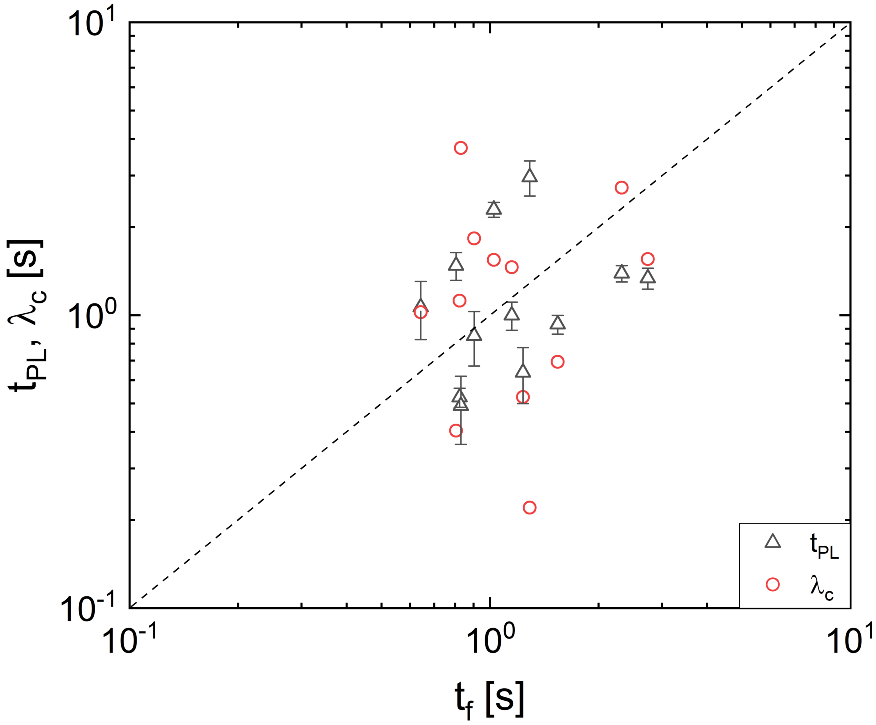

Figure S5. Shear relaxation time, λ_c obtained from the Cross model fits to the apparent shear viscosity *vs.* shear rate data acquired using torsional rheometry and the characteristic timescale, t_{PL} extracted from the power law fits to the radius evolution datasets obtained using DoS rheometry are both plotted against the filament lifespan, t_f.