

Supplementary Information

Tuning Depth of Cure in Resins with Photoabsorbing Fillers for Vat Photopolymerization

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Filler type	ϕ	D_p [μm]	α [μm^{-1}]	E_c [mJ/cm^2]	β	K [μm^{-1}]
20 μm SiC	.05	97.4	.010	2.29	0.91	0.15
	.10	55.7	.017	1.46		
	.15	36.4	.027	0.69		
	.20	26.6	.037	0.43		
	.25	22.8	.043	0.45		
	.30	17.8	.055	0.32		
	.40	16.8	.059	1.21		
2 μm SiC	.05	12.8	.078	1.20	0.92	1.25
	.10	5.9	.167	0.97		
	.15	4.9	.200	1.05		
	.20	3.4	.294	0.73		
500 nm SiC	.05	6.8	.147	26.9	N/A	N/A
80 nm SiC	.05	3.3	.299	0.33	N/A	N/A
2 μm Hexaferrite	.05	57.4	.017	4.26	1.09	0.43
	.10	32.7	.030	6.10		
	.15	16.7	.059	1.99		
5 μm AC	.05	22.1	.045	6.35	0.79	0.43
	.10	17.6	.056	5.45		
	.15	9.2	.110	19.6		
	.20	8.0	.125	21.2		
4 μm BC	.05	7.7	.129	1.75	0.72	1.09
	.10	4.9	.204	5.65		
	.15	3.5	.286	9.03		
2 μm BC	.05	6.4	.156	5.88	N/A	N/A

Table S1: Measured photokinetic properties for various characterized resins filled with photoabsorbing particles at 405 nm

Sample: 40% SiC Diacrylate
Size: 9.1600 mg
Method: SiC

DSC

File: C:\...Hunter\40% SiC Diacrylate.dsc-0
Operator: JAM
Run Date: 22-Nov-2024 10:54
Instrument: DSC Q2000 V24.11 Build 124

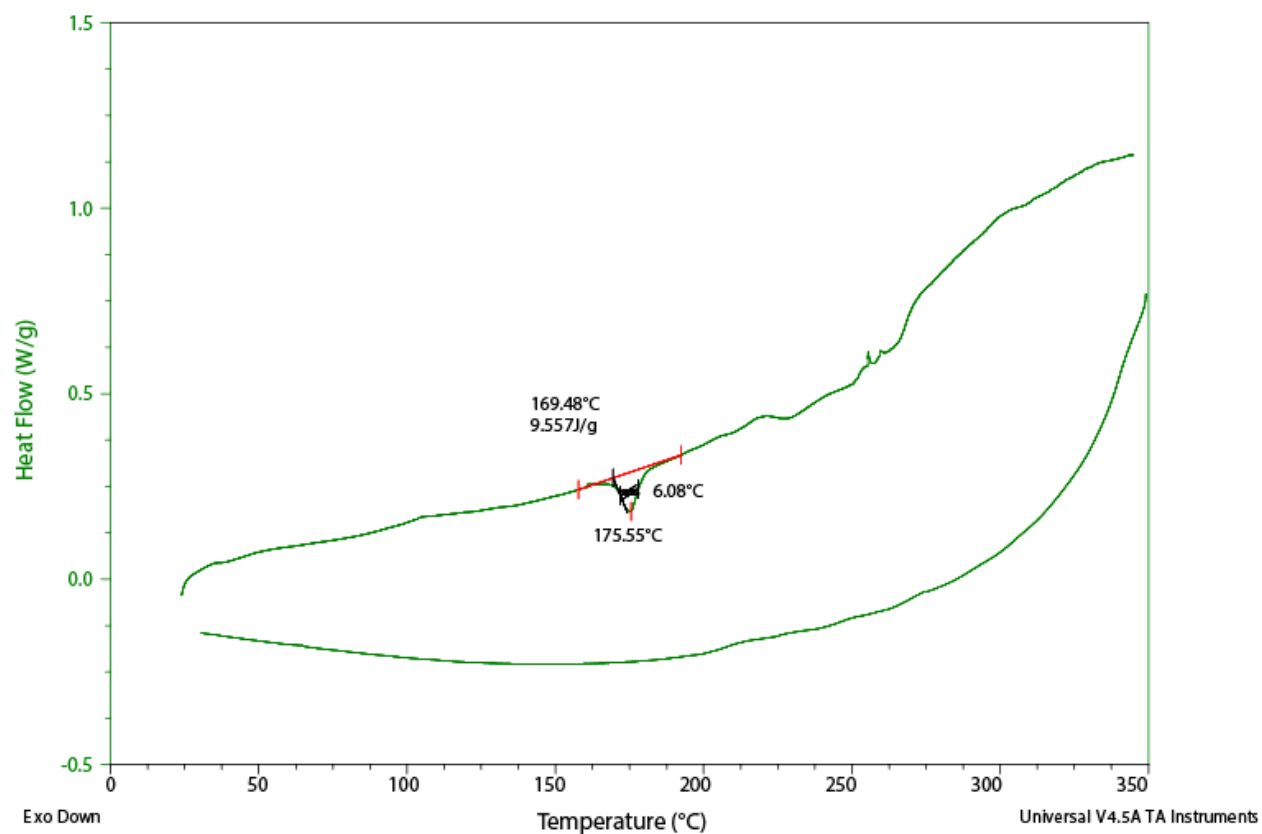


Figure S2: DSC analysis of 70/30 Urethane Diacrylate Isobornyl acrylate 20 μm SiC composite resin at $\phi=.4$. Samples were placed in a non-sealed pan and heated to 350 °C at a rate of 10°C per minute and then returned to room temperature at a rate of 20 °C per minute.

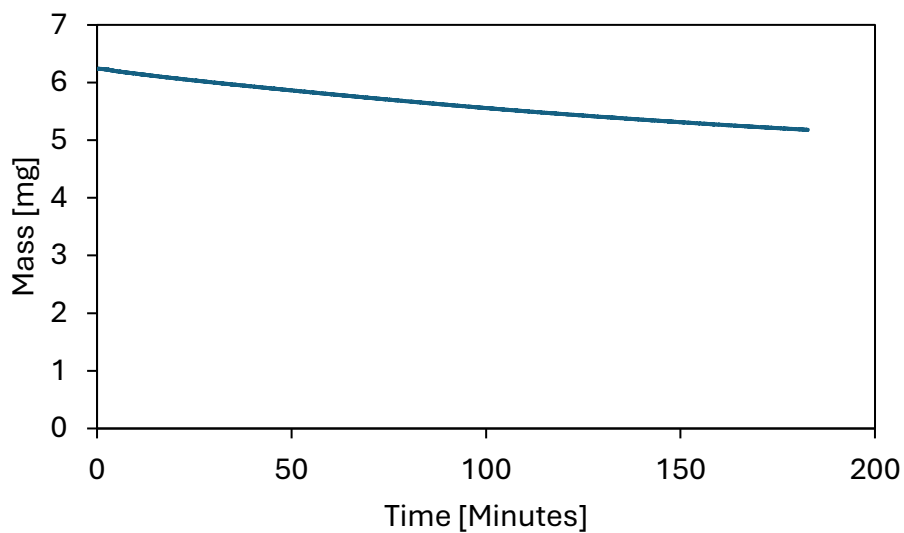


Figure S3: TGA analysis of 70/30 Urethane Diacrylate Isobornyl acrylate 20 μm SiC composite resin at $\phi=.4$. Sample heated to 50°C at a heating rate of 10°C per minute and held for a 3-hour period.

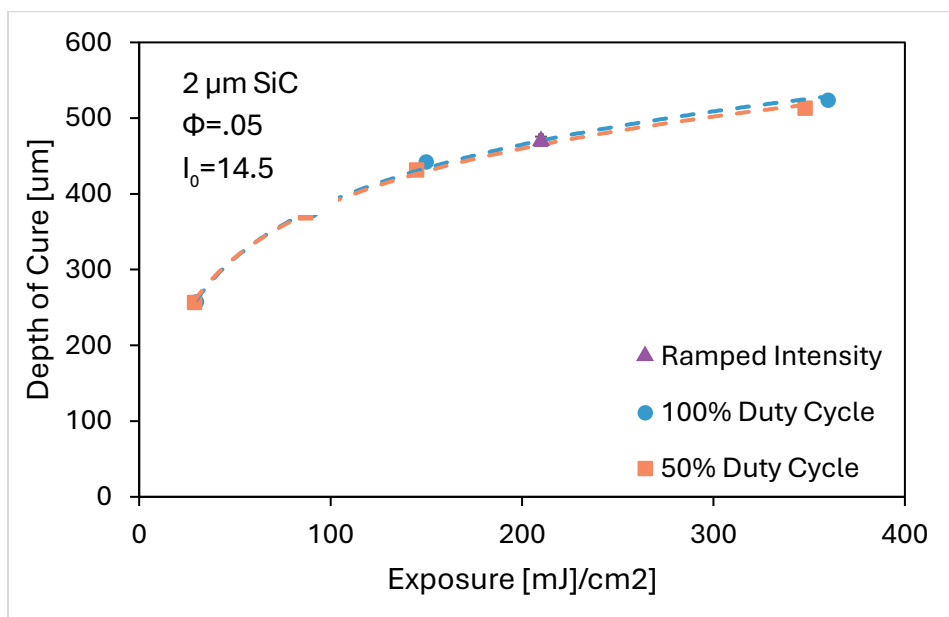


Figure S4: Working curves of 70/30 Urethane Diacrylate Isobornyl acrylate 20 μm SiC composite resin with varying exposure duty cycles.

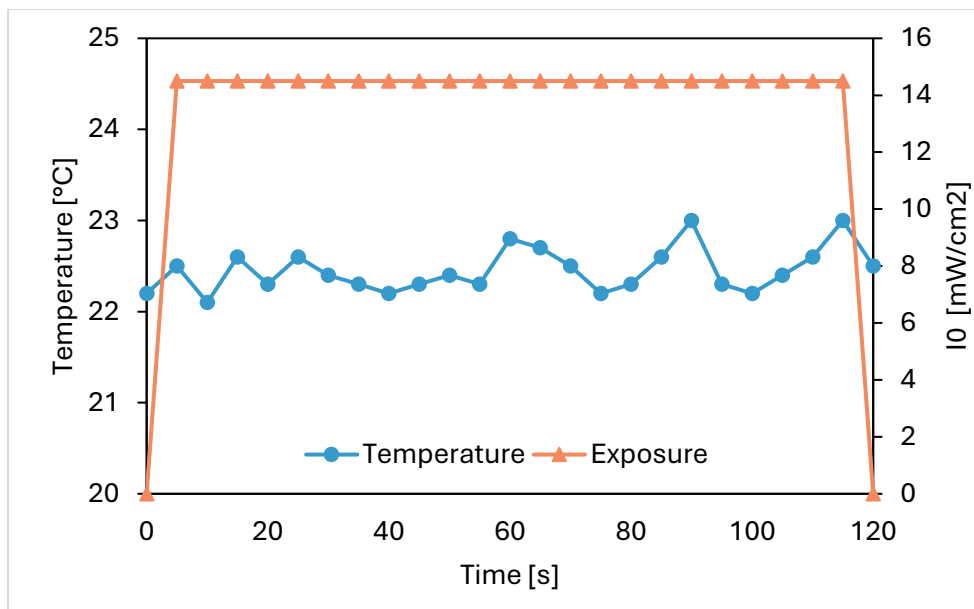


Figure S5: Temperature of resin across 2-minute period of exposure to UV-Light $I_0=14.5$

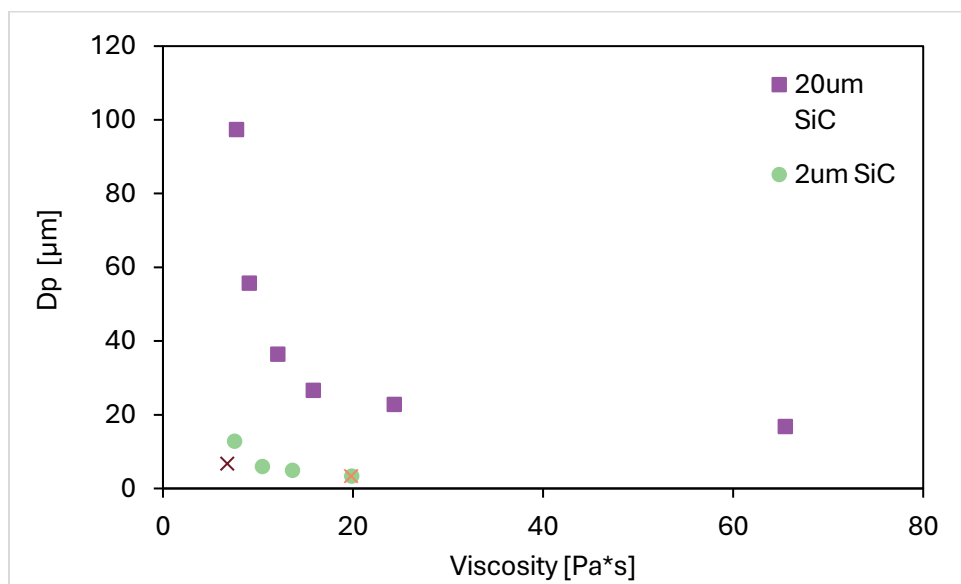


Figure S5: Viscosity vs D_c for SiC particles across particle size.

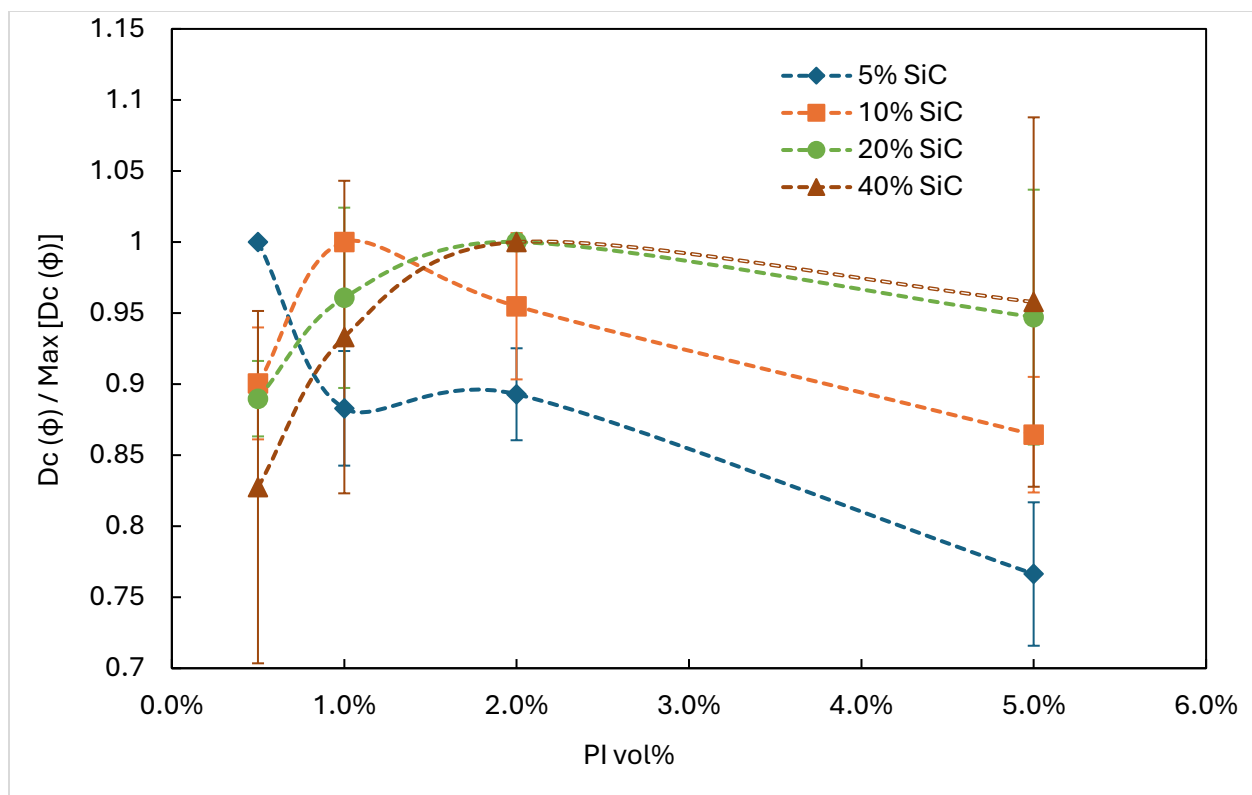


Figure S6: Figure 3a with Error Bars, A plot of the relative D_c for 20 μm SiC across PI vol% relative to maximum D_c for a BAPO PI in a resin filled with 20 μm SiC across a range of ϕ . (

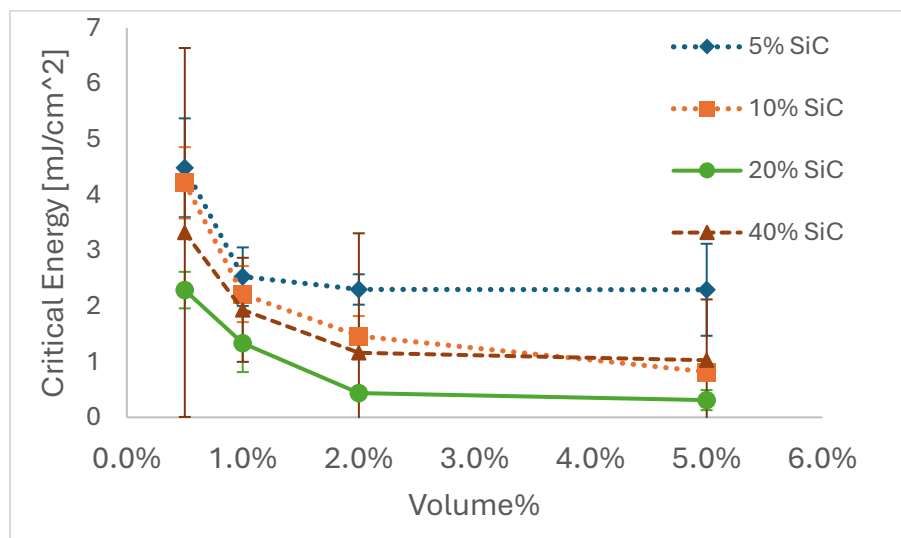


Figure S7: Figure 3b with Error Bars, Calculated E_c values for SiC filled resins across a range of ϕ .

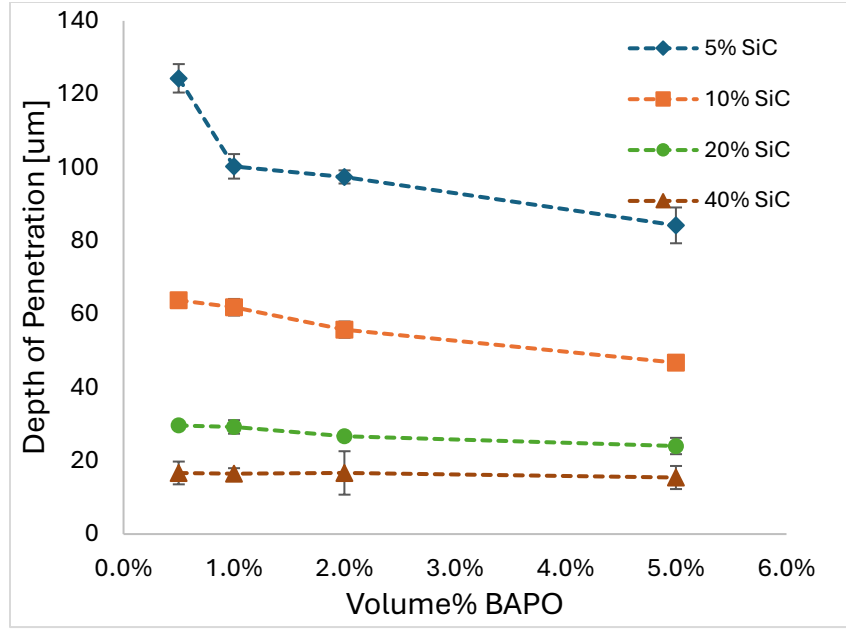


Figure S8: Figure 3c with Error Bars, Calculated D_p values for SiC filled resins across a range of ϕ .

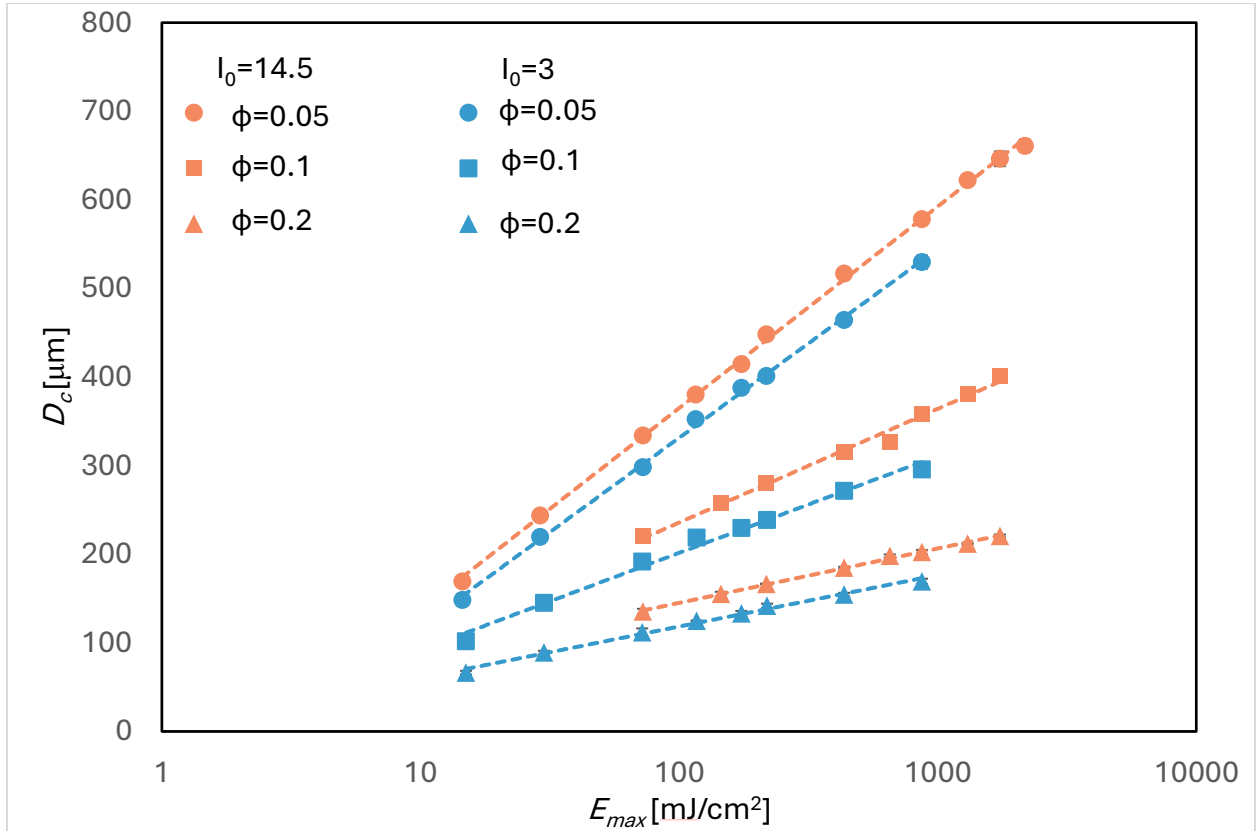


Figure S9: Figure 3d with Error Bars, 20 μm SiC working curves for a range of ϕ printed at $I_o = 14.5$ and 3mW/cm^2 .