Supplemental materials for Polymer Journal

Stress relaxation and improved fracture toughness of metal bonding using flexible monolith sheets and an epoxy adhesive

Yoshiyuki Kamo and Akikazu Matsumoto

Contents

Table S1. Tensile strength and elongation determined at 23°C, 90°C, and 155°C for the thermosets prepared from the sheet-type adhesives prepared under various γ conditions in the presence or absence of BATGE.

Conditions for epoxy monolith fabrication	Tensile strength at break（MPa）			Elongation at break (%)		
	23°C	90°C	155°C	23°C	90°C	155°C
None (CLS1194)	16.1	10.8	11.7	1.10	1.13	1.71
γ = 1.0	18.6	8.7	8.1	1.60	1.45	1.74
γ = 1.2	17.4	6.5	5.1	1.72	1.32	2.65
γ = 1.4	16.7	6.3	5.7	1.67	1.49	2.64
γ = 1.6	14.5	7.1	4.0	1.80	1.40	2.09
γ = 1.8	14.4	5.9	3.2	1.80	1.41	2.21
γ = 1.4, BATGE 5%	21.4	11.3	2.8	1.80	2.00	3.00
γ = 1.4, BATGE 10%	22.2	11.7	2.4	1.80	1.90	2.70
γ = 1.4, BATGE 20%	16.2	8.8	2.3	1.90	2.50	2.60

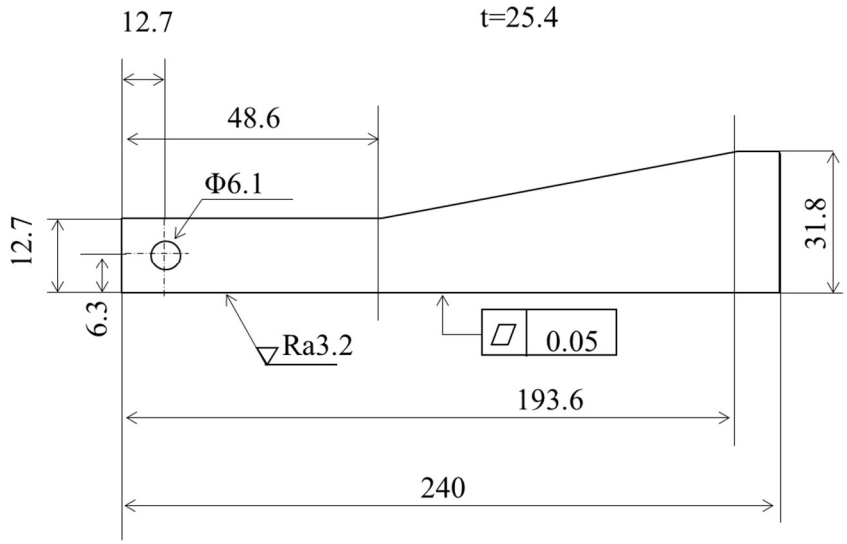

Figure S1. A test piece according to ASTM D3433 (size in mm).

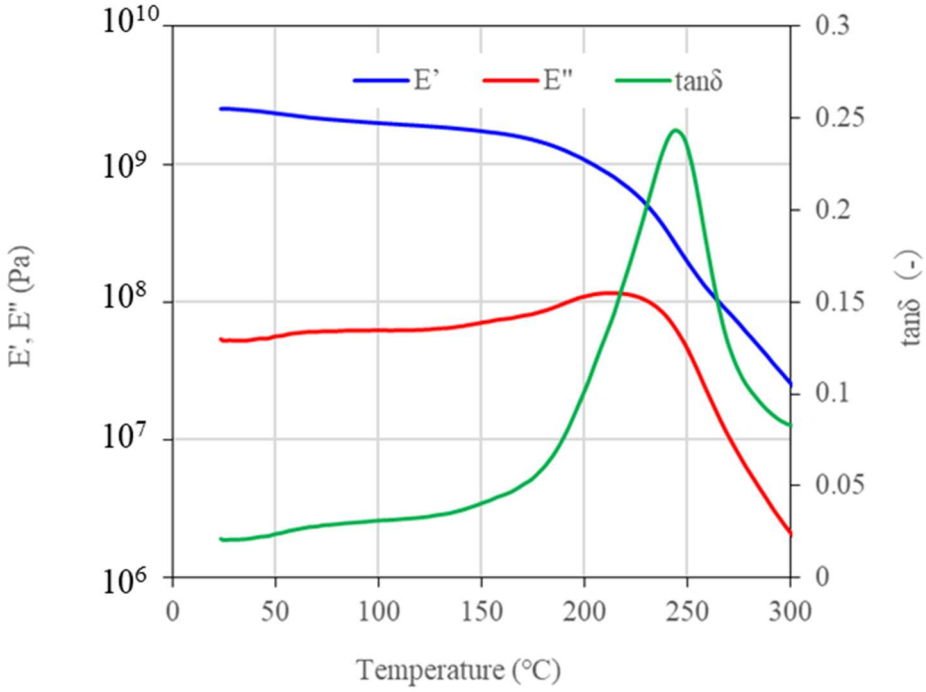

Figure S2. DMA curves for the thermoset obtained by the curing of CLS1194 as the commercial liquid epoxy adhesive without a monolith sheet.

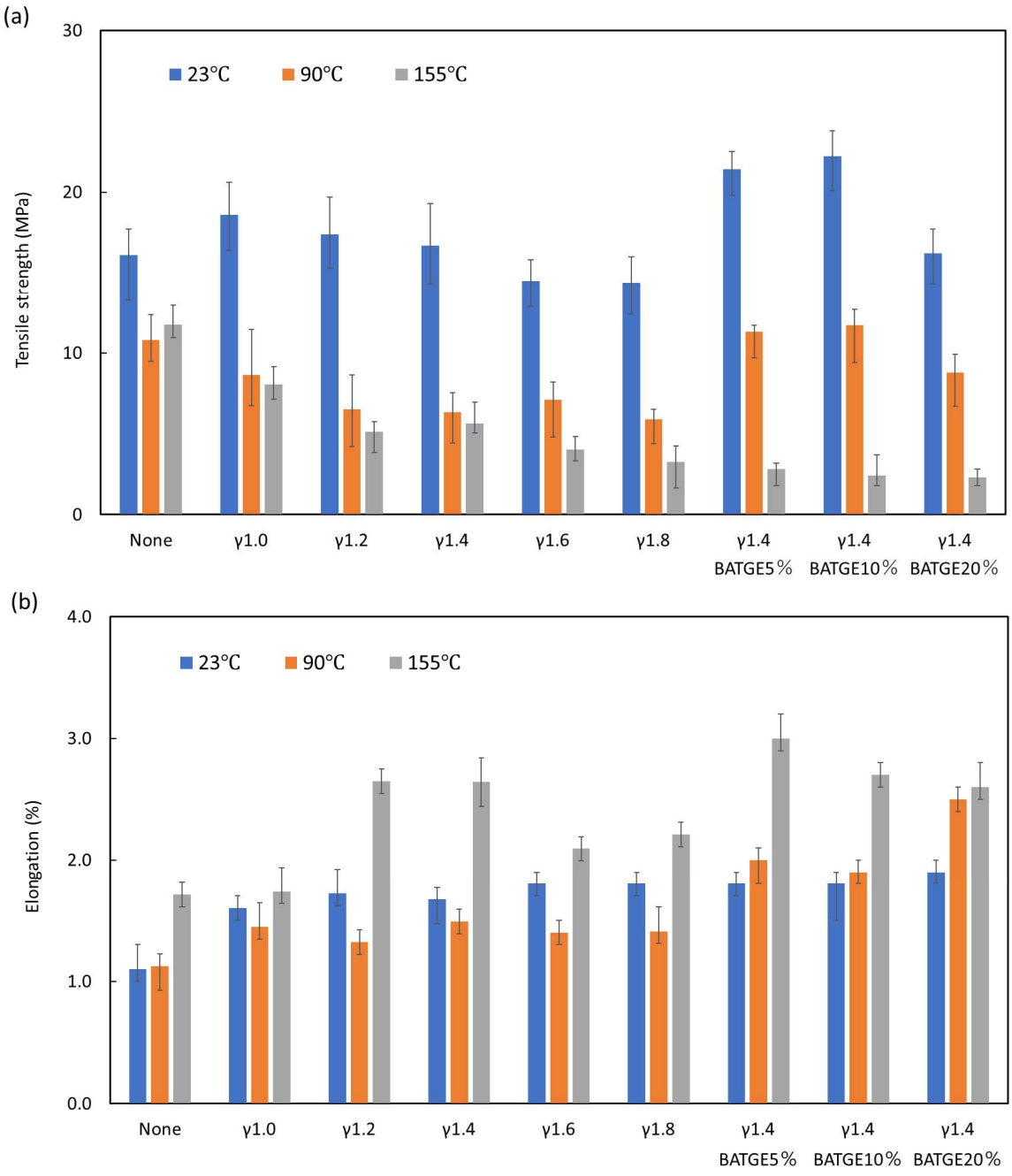

Figure S3. (a) Tensile strength and (b) elongation determined at 23°C, 90°C, and 155°C for the thermosets prepared from the sheet-type adhesives prepared under various γ conditions in the presence or absence of BATGE.

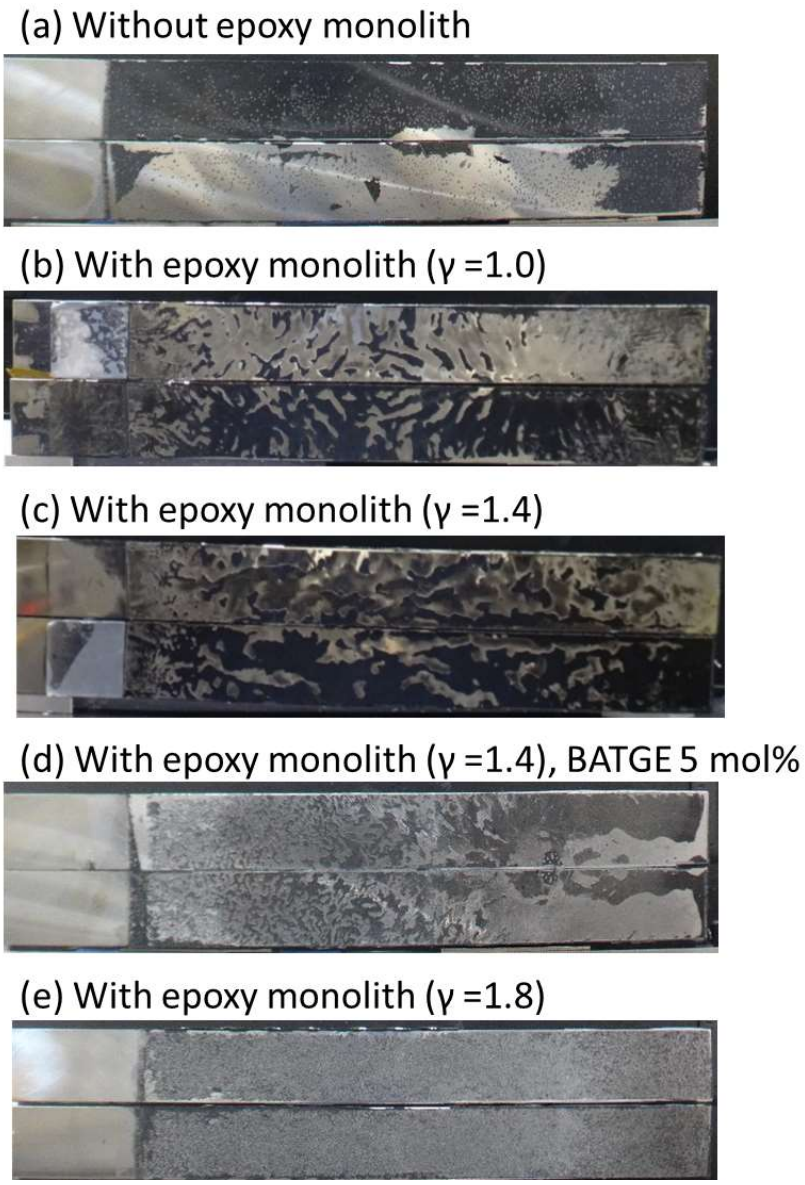

Figure S4. The photographs of the fracture surfaces after the TDCB test using various sheet-type epoxy adhesives. (a) Without the epoxy monolith, (b) with the epoxy monolith (γ = 1.0), (c) with the epoxy monolith (γ = 1.4), (d) with the epoxy monolith (γ = 1.4) in the addition of 5 mol% of BATGE, and (f) with the epoxy monolith (γ = 1.8).

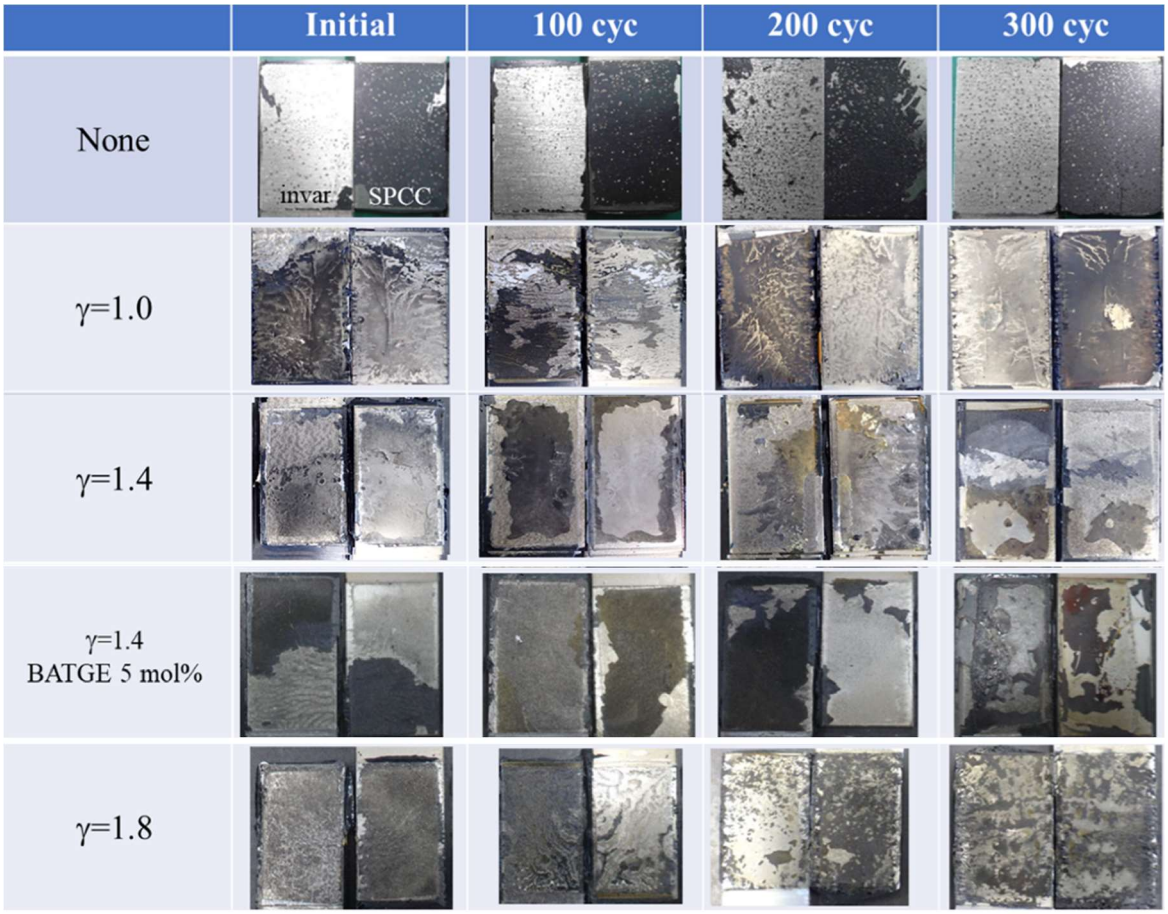

Figure S5. The photographs of the fracture surfaces of the sheet-type epoxy adhesives using SPCC and Super Inver as the adherends for heat cycle test.

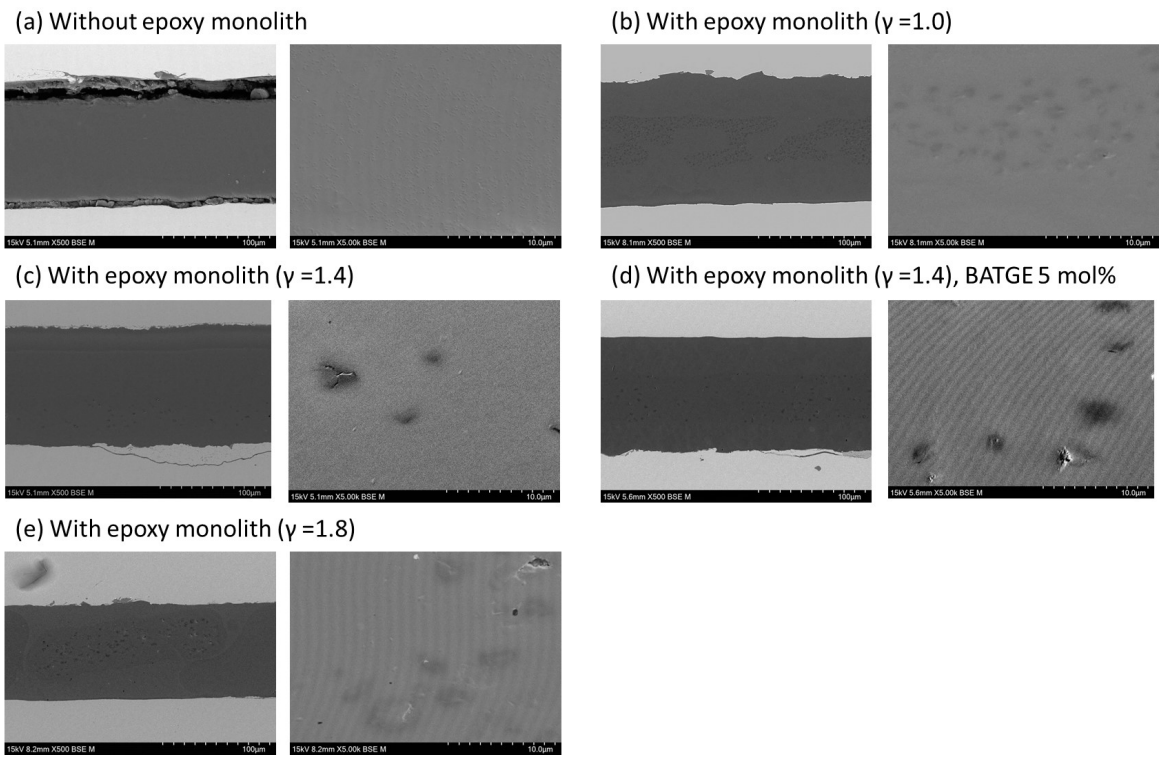

Figure S6. The cross-sectional SEM images of the sheet-type epoxy adhesives. (a) Without the epoxy monolith, (b) with the epoxy monolith (γ = 1.0), (c) with the epoxy monolith (γ = 1.4), (d) with the epoxy monolith (γ = 1.4) in the addition of 5 mol% of BATGE, and (f) with the epoxy monolith (γ = 1.8). After fixing the cured sample with resin, a cross section was cut out, and an observation surface was formed by buffing and argon sputtering.