

Supporting information

***In situ* Fourier transform infrared spectroscopic imaging for elucidating variations in chemical structures of polymer composites at the matrix-filler interface during reactive processing**

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TABLE OF CONTENTS

1. Cross-sectional images of composites	S3
2. Mechanical properties of SEBS	S4
3. Elastic moduli of MA-SEBS/AmSS	S5
4. FTIR spectrum of SEBS	S6
5. FTIR spectra of SS and AmSS	S7

1. Cross-sectional images of composites

The filler dispersion in MA-SEBS/AmSS and MA-SEBS/SS was evaluated by observation at cross-section of the sample sheets using a microscope (TG300PC2, Shodensha, Osaka, Japan).

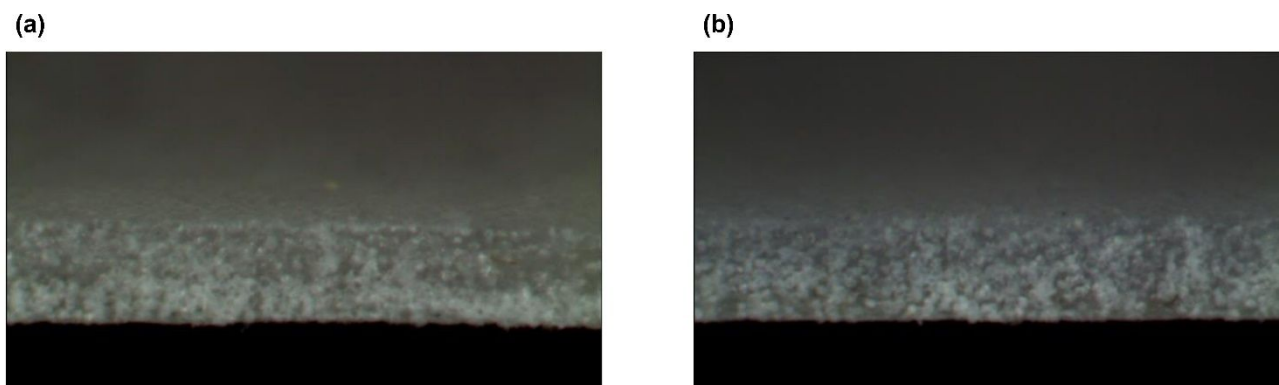


Figure S1. Cross-sectional optical images of (a) MA-SEBS/AmSS and (b) MA-SEBS/SS.

2. Mechanical properties of SEBS

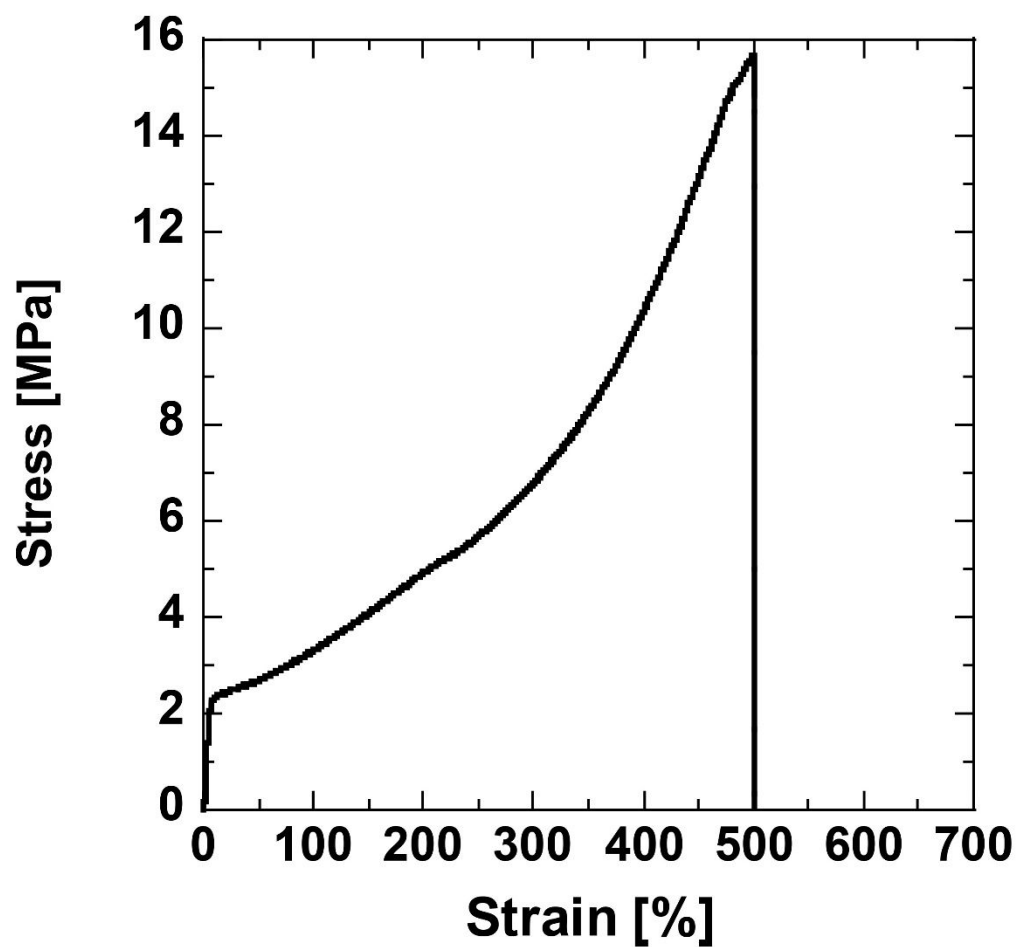


Figure S2. Stress-strain curve of SEBS.

Table S1. Mechanical properties of SEBS

Sample	Elastic modulus [MPa]	Stress at 100% strain [MPa]	Elongation at break [%]
SEBS	50.3 ± 7.6	3.2 ± 0.2	487 ± 15

3. Elastic moduli of MA-SEBS/AmSS

Elastic moduli of the MA-SEBS composites containing 0, 10, 20 and 30 wt% of AmSS were measured. The elastic modulus increases with increasing AmSS content without steep increase of the value. This indicates that a percolated structure in the composite at the high wight loading of the filler is not formed for the polymer composites.

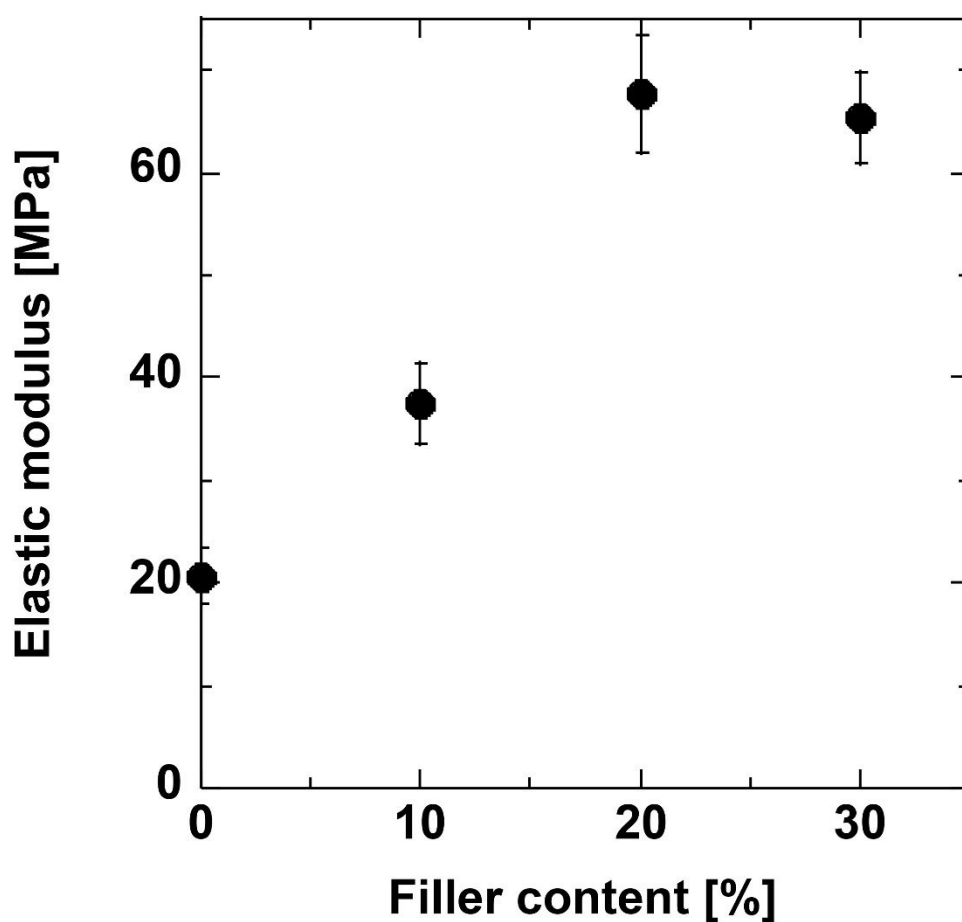


Figure S3. Elastic moduli of MA-SEBS composites containing 0, 10, 20 and 30 wt% of AmSS.

4. FTIR spectrum of SEBS

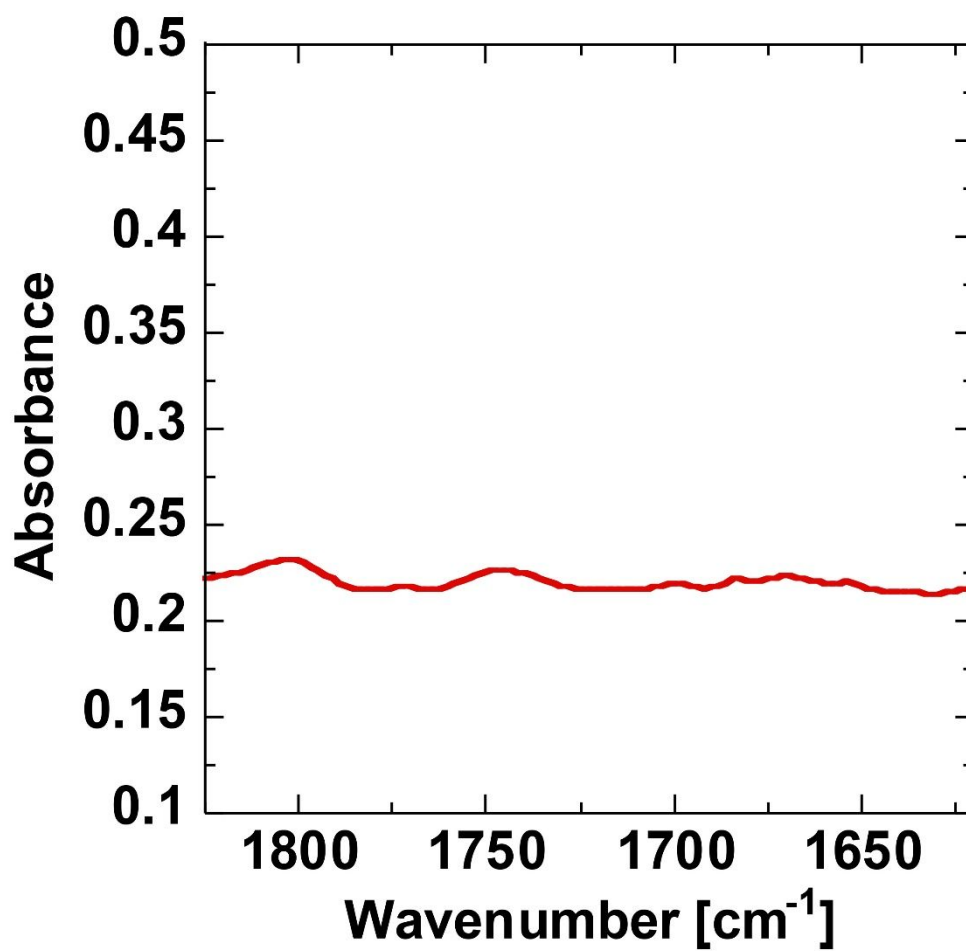


Figure S4. FTIR spectrum of SEBS in the 1825 – 1620 cm⁻¹ region.

5. FTIR spectra of SS and AmSS

The FTIR spectra of the SS and AmSS show different features (Figure S5a). AmSS has clear absorption bands assignable to the C-H stretching mode in the 3100 - 2700 cm^{-1} region, and a broad absorption band assignable to the N-H stretching mode in the 3400 - 2500 cm^{-1} region, which are derived from the aminopropyl group. On the other hand, SS shows no significant absorption bands attributable to C-H or N-H groups. A broad band in the 3600-3200 cm^{-1} region is assigned to silanol groups interacting mutually through hydrogen bonds. Absorption near 3750 cm^{-1} is due to the OH stretching vibration of isolated silanol groups which are located at silica surface.¹ IR absorption intensity at 3750 cm^{-1} for AmSS is much smaller than that for SS. In other words, the most of surface silanol groups of AmSS are reacted during the modification process with aminopropyl groups. In addition, no significant IR absorption in the 1825 - 1620 cm^{-1} region, where some carbonyl peaks often appear, is observed in either SS or AmSS (Figure S5b).

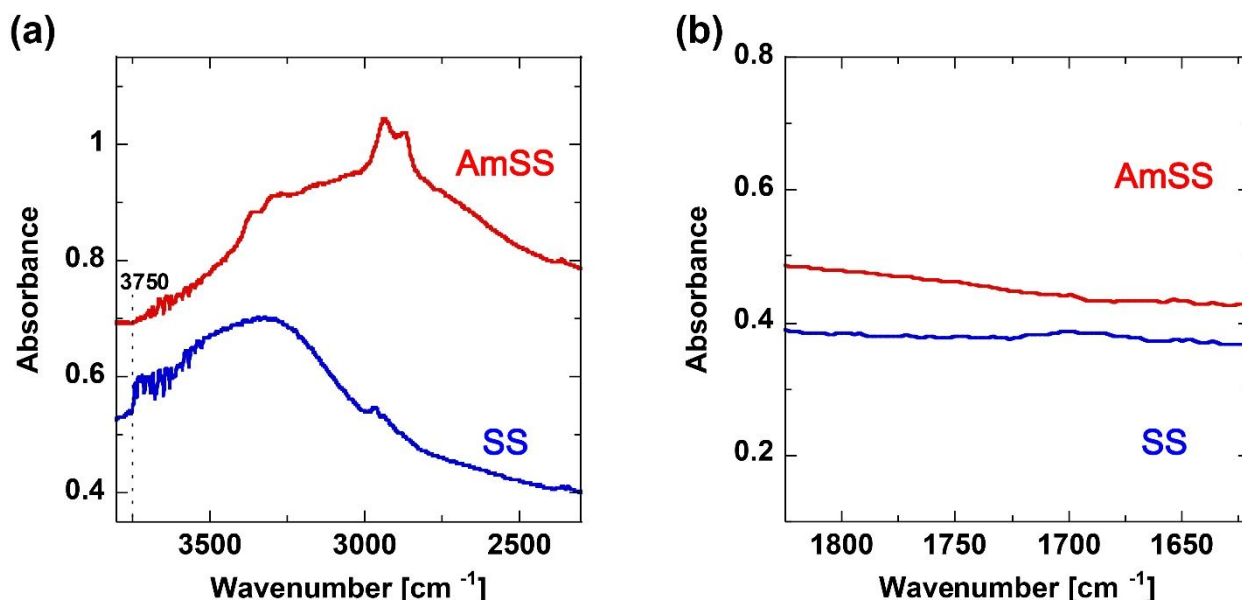


Figure S5. FTIR spectra of SS and AmSS in (c) 3800 - 2300 cm^{-1} and (d) 1825 - 1620 cm^{-1} regions.

REFERENCES

- (1) Morrow, B. A.; McFarlan, A. J. Surface vibrational modes of silanol groups on silica. *J. Phys. Chem.* **1992**, *96*, 1395-1400.