Effects of chain extender on properties and foaming behavior of polypropylene foam

Do Young Kim, Ji Hun Cha, and Kwan Ho Seo*

Department of Polymer Science and Engineering, Kyungpook National University, Daegu, 41566, Republic of Korea

*Corresponding author E-mail: khseo@knu.ac.kr
Table S1. Compositions of PP/GMA mixtures

| Sample | PP (wt%) | GMA (phr) | Phenolic antioxidant (phr) |
|--------|----------|-----------|---------------------------|
| 1      | 100      | 0         | 0.3                       |
| 2      | 100      | 0.5       | 0.3                       |
| 3      | 100      | 1.0       | 0.3                       |
| 4      | 100      | 1.5       | 0.3                       |
| 5      | 100      | 2.0       | 0.3                       |
| 6      | 100      | 2.5       | 0.3                       |
| 7      | 100      | 3.0       | 0.3                       |
Table S2. ΔMFI of PP, grafted PP, and modified PP

| Sample  | ΔMFI  |
|---------|-------|
| PP      | 11.6  |
| GPP     | 21.8  |
| MPP0.5  | 11.4  |
| MPP1.0  | 9.8   |
| MPP1.5  | 4.5   |
| MPP2.0  | 3.8   |

ΔMFI = MFI 240 °C-MFI 200 °C
Table S3. Effect of AA content on thermal stability of modified PP

| Description | $T_{d,5}$ (°C) | $T_{d,10}$ (°C) | $T_{d,max}$ (°C) |
|-------------|----------------|-----------------|------------------|
| PP          | 339.3          | 355.3           | 425.6            |
| GPP         | 331.5          | 352.9           | 432.3            |
| MPP0.5      | 341.5          | 360.0           | 433.2            |
| MPP1.0      | 342.5          | 361.6           | 432.9            |
| MPP1.5      | 346.7          | 366.7           | 434.4            |
| MPP2.0      | 347.2          | 367.1           | 433.5            |
Table S4. DSC data for PP, grafted PP, and modified PP samples

| Sample  | $T_c$ (°C) | $T_m$ (°C) | $\Delta H_f$ (°C) | $X_c$ (°C) |
|---------|------------|------------|-------------------|------------|
| PP      | 121.0      | 165.2      | 137.0             | 65.6       |
| GPP     | 127.4      | 164.8      | 119.8             | 57.3       |
| MPP0.5  | 134.6      | 165.2      | 115.6             | 55.3       |
| MPP1.0  | 134.8      | 165.8      | 111.3             | 53.3       |
| MPP1.5  | 135.4      | 165.2      | 108.9             | 52.1       |
| MPP2.0  | 135.9      | 165.3      | 109.4             | 52.3       |
Figure S1. IR calibration curve for determining the amount of GMA grafted onto PP
Figure S2 Cole–Cole plot analysis for PP, grafted PP, and modified PP samples.
Figure S3. Han plot analysis for PP, grafted PP, and modified PP samples.
Figure S4. Loss factor analysis (tan \( \delta \)) of PP, grafted PP, and modified PP samples.
Figure S5. Variation of VER with ORTs for modified PP foams with various AA contents at different temperatures: (a) PP, (b) GPP, (c) MPP0.5, (d) MPP1.0, (e) MPP1.5, and (f) MPP2.0.