**Supporting information**

****

Figure S. Chemical structure analysis of synthesized covalent a) and non-covalent b) chain extenders.

**Table S1. Melt flow index (MFI) results of PGA/PCL blending plastics according to blending ratio and introducing with covalent or non-covalent chain extenders.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Sample name** | **PGA****(g)** | **PCL****(g)** | **G-CE\*a (g)** | **D-CE\*b (g)** | **ADR-4368\*c (g)** | **Time (min)** | **MFI (g/10min)** |
| PGA\_0 | 150 | - | - | - | - | 0 | 24.50  |
| PGA\_4 | 150 | - | - | - | - | 4 | 25.92  |
| PGA | 150 | - | - | - | - | 6 | 26.94  |
| PGA\_8 | 150 | - | - | - | - | 8 | 30.58  |
| PGA\_10 | 150 | - | - | - | - | 10 | 31.45  |
| PGA\_12 | 150 | - | - | - | - | 12 | 32.86  |
| 10 | 135 | 15 | - | - | - | 6 | 37.02  |
| 10G | 135 | 15 | 0.75 | - | - | 6 | 15.56 |
| 10D | 135 | 15 | - | 0.3 | - | 6 | 22.66 |
| 10GD | 135 | 15 | 0.75 | 0.3 | - | 6 | 21.1 |
| 10J | 135 | 15 | - | - | 1.5 | 6 | 38.92 |
| 30 | 105 | 45 | - | - | - | 6 | 63.42  |
| 30G | 105 | 45 | 0.75 | - | - | 6 | 18.25 |
| 30D | 105 | 45 | - | 0.3 | - | 6 | 24.69 |
| 30GD | 105 | 45 | 0.75 | 0.3 | - | 6 | 24.75 |
| 50 | 75 | 75 | - | - | - | 6 | 44.07  |
| 50G | 75 | 75 | 0.75 | - | - | 6 | 17.91 |
| 50D | 75 | 75 | - | 0.3 | - | 6 | 32.36 |
| 50GD | 75 | 75 | 0.75 | 0.3 | - | 6 | 27.76 |
| 10G\_0.2 | 135 | 15 | 0.3 | - | - | 6 | 18.39 |
| 10G\_0.5 (10G) | 135 | 15 | 0.75 | - | - | 6 | 15.56 |
| 10G\_1.0 | 135 | 15 | 1.5 | - | - | 6 | 16.28 |
| 10D\_0.2 | 135 | 15 | - | 0.3 | - | 6 | 22.66 |
| 10D\_0.5 (10D) | 135 | 15 | - | 0.75 | - | 6 | 44.66 |
| 10D\_1.0 | 135 | 15 | - | 1.5 | - | 6 | 52.82 |

\*a ; Ionic chain extender (D-CE)

\*b ; Covalent chain extender (G-CE)

\*c ; Joncryl® chain extender purchased from BASF Co. Ltd

**Table S2. Differential scanning calorimetry (DSC) of PGA and PGA/PCL blending plastics with or without chain extenders.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Sample name** | **Tc1 at PCL****(℃)** | **area****(mJ)** | **Tc2 at PGA****(℃)** | **area****(mJ)** | **Tm1 at PGA****(℃)** | **Tm2 at PGA****(℃)** |
| PGA | - | - | 193.46  | 536.24  | 210.76 | 221.67  |
| 10 | 13.75  | 16.53  | 193.13  | 281.21  | 214.83  | 222.24  |
| 10G | 14.71  | 32.34  | 190.91  | 389.86  | 215.24  | 221.32  |
| 10D | 11.60  | 19.08  | 192.39  | 283.32  | 214.01  | 221.33  |
| 10GD | 11.37  | 10.06  | 193.05  | 172.94  | 215.61  | 222.60  |

**Table S3. Mechanical properties of PGA/PCL blending plastics according to blending ratio and introducing with or without chain extenders.**

|  |  |  |
| --- | --- | --- |
| **Sample name** | **Tensile strength (kgf/mm2)** | **Elongation (%)** |
| PGA | 8.22 | 4.80 |
| 10 | 11.60 | 7.20 |
| 30 | 5.67 | 6.20 |
| 50 | 3.45 | 5.15 |
| 10G | 8.99 | 18.45 |
| 30G | 4.65 | 11.15 |
| 50G | 2.15 | 7.20 |
| 10D | 9.31 | 26.60 |
| 30D | 5.69 | 13.60 |
| 50D | 2.41 | 11.20 |
| 10J | 9.03 | 14.35 |