Table 1. Prepared films of PP and PP-MWCNT nanocomposite

|  |  |  |
| --- | --- | --- |
| **Sample** | **Thickness (mm)** | **MWCNT (%)** |
| PP01 | 0.25 ± 0.01 | 0 |
| PP02 | 0.39 ± 0.02 | 0 |
| PP03 | 0.69 ± 0.04 | 0 |
| PP41 | 0.35 ± 0.03 | 4 |
| PP42 | 0.50 ± 0.01 | 4 |
| PP43 | 2.07 ± 0.06 | 4 |

Table 2. Experimental conditions for solar aging of PP and PP-MWCNT composite samples

|  |  |
| --- | --- |
| **Parameter** | **Condition** |
| A cycle of weathering | 120 min (sunshine: 108 min and rain: 12 min) |
| Humidity | 8-20% for Sunshine and over 60% for Rain |
| Solar light irradiation | 700 W/m2 |
| Wavelength of solar light | 300-800 nm |
| Chamber Temperature | 33-37 oC |
| Black Substance Temperature | 65 oC |

Table 3. Sample aging time and converted real solar exposure time for the aging study

|  |  |  |
| --- | --- | --- |
| **Aging time** | **Total solar radiant (MJ/m2)** | **Real exposure time (Month)** |
| **756 h** | 1909.5 | 3.5 |
| **1512 h** | 3811.4 | 6.9 |
| **2268 h** | 5726.6 | 10.4 |
| **3024 h** | 7620.4 | 13.9 |

Table 4. Experimental Setting of thermogravimetric and differential scanning calorimetry

|  |  |  |  |
| --- | --- | --- | --- |
| **TGA** | | **DSC** | |
| Instrument: | Perkin Elmer Pyrus 7 TGA | Instrument: | TA Q2000 DSC |
| Sample Size: | ~ 3.0 mg | Sample Size: | ~ 3.0 mg |
| Sample Pan: | Standard Aluminium Pan | Sample Pan: | Aluminium |
| Temperature Range: | 30 to 800 oC | Temperature Range: | 90 to 180 oC |
| Scanning Rate: | 10 to 50 oC/min | Rate of Heating or Cooling: | 10 oC/min |
| Purge Gas and Rate: | N2 at 20 mL/min | Purge Gas and Rate: | N2 at 20 mL/min |

Table 5. Melting temperature and crystallization temperature of aged PP and PP-MWCNT composites

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Melting Temperature (oC) | | | | | | Crystallization Temperature (oC) | | | | | |
| Ageing time (h) | PP01 | PP02 | PP03 | PP41 | PP42 | PP43 | PP01 | PP02 | PP03 | PP41 | PP42 | PP43 |
| 0 | 162.9 | 163.8 | 164.1 | 163.1 | 163.0 | 161.9 | 117.0 | 117.4 | 117.3 | 126.6 | 126.6 | 126.0 |
| 756 | 152.5 | 162.8 | 160.4 | 162.8 | 162.7 | 160.5 | 114.0 | 115 | 115.3 | 125.9 | 125.9 | 126.0 |
| 1512 | 142.5 | 144.9 | 149.3 | 159.8 | 155.7 | 160.2 | 108.1 | 111.2 | 112.4 | 124.6 | 124.9 | 125.6 |
| 2268 | - | 140.0 | 143.9 | 153.0 | 153.4 | 163.1 | - | 107.9 | 110.0 | 121.3 | 125.0 | 126.5 |
| 3024 | - | - | 144.3 | 151.0 | 153.9 | 159.5 | - | - | 110.0 | 122.1 | 123.2 | 123.9 |