**SUPPLEMENTARY INFORMATION**

**Table 1: Pseudo-Avrami parameters for nonisothermal crystallization of neat PHB**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **  (°C/min) | Melt Crystallization | | Cold Crystallization | |
| ln*K'* | *n'* | ln*K'* | *n'* |
| 2 | -5.244±0.008 | 2.414±0.002 |  |  |
| 4 | -5.633±0.008 | 2.312±0.004 | -2.457±0.015 | 2.795±0.014 |
| 8 | -2.542±0.004 | 2.264±0.003 | -1.165±0.015 | 2.727±0.015 |
| 12 | -0.826±0.004 | 2.177±0.004 | -0.590±0.014 | 3.218±0.015 |
| 16 |  |  | -0.034±0.015 | 3.250±0.015 |
| 24 |  |  | 0.455±0.016 | 2.933±0.014 |
| 32 |  |  | 1.148±0.020 | 2.631±0.016 |

**Table 2: Pseudo-Avrami parameters for nonisothermal crystallization of PHB/0.5%CB**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **  (°C/min) | Melt Crystallization | | Cold Crystallization | |
| ln*K'* | *n'* | ln*K'* | *n'* |
| 2 | -7.209±0.170 | 3.218±0.008 |  |  |
| 4 | -5.663±0.013 | 3.012±0.007 |  |  |
| 8 | -3.659±0.008 | 2.886±0.006 |  |  |
| 12 | -2.176±0.190 | 2.583±0.150 | 1.075±0.014 | 2.367±0.015 |
| 16 | -1.643±0.005 | 2.580±0.005 | 0.300±0.016 | 3.014±0.010 |
| 24 | -0.096 ± 0.008 | 2.326 ± 0.008 | 0.630 ± 0.003 | 3.535 ± 0.005 |
| 32 |  |  | 1.060±0.016 | 2.764±0.013 |

**Table 3: Pseudo-Avrami parameters for nonisothermal crystallization of PHB/1%CB**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **  (°C/min) | Melt Crystallization | | Cold Crystallization | |
| ln*K'* | *n'* | ln*K'* | *n'* |
| 2 | -7.005±0.013 | 3.172±0.006 |  |  |
| 4 | -6.476±0.024 | 3.427±0.015 |  |  |
| 6 | -4.513±0.008 | 2.931±0.006 |  |  |
| 8 | -3.914±0.007 | 2.804±0.005 | -0.652±0.010 | 2.562±0.010 |
| 12 | -2.088±0.003 | 2.464±0.003 | -0.818±0.000 | 2.843±0.000 |
| 16 | -0.893±0.005 | 2.285±0.005 | -0.527±0.016 | 2.966±0.016 |
| 24 |  |  | -0.103±0.014 | 2.840±0.014 |
| 32 |  |  | 0.635± 0.018 | 2.661±0.015 |

**Table 4: Pseudo-Avrami parameters for nonisothermal crystallization of PHB/5%CB**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **  (°C/min) | Melt Crystallization | | Cold Crystallization | |
| ln*K'* | *n'* | ln*K'* | *n'* |
| 2 | -7.754±0.030 | 3.234±0.010 |  |  |
| 4 | -5.020±0.015 | 3.049±0.010 |  |  |
| 6 | -4.387±0.011 | 3.172±0.009 |  |  |
| 8 | -2.900±0.005 | 2.711±0.005 |  |  |
| 12 | -2.209±0.006 | 2.750±0.006 |  |  |
| 16 | -1.521±0.006 | 2.508±0.006 | 0.906±0.019 | 2.520±0.013 |
| 24 | 0.165±0.008 | 2.459±0.008 | 0.924±0.019 | 2.650±0.015 |
| 32 | 1.375±0.010 | 2.243±0.007 | 1.026±0.014 | 2.969±0.011 |

**Table 5: Pseudo-Avrami parameters for nonisothermal crystallization of PHB/10%CB**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **  (°C/min) | Melt Crystallization | | Cold Crystallization | |
| ln*K'* | *n'* | ln*K'* | *n'* |
| 2 | -5.970±0.018 | 2.969±0.009 |  |  |
| 4 | -4.465±0.013 | 3.003±0.010 |  |  |
| 6 | -3.346±0.012 | 2.843±0.011 |  |  |
| 8 | -3.624±0.008 | 3.625±0.008 |  |  |
| 12 | -2.166±0.008 | 2.961±0.009 |  |  |
| 16 | -1.391±0.008 | 2.723±0.008 |  |  |
| 24 | -0.680 ± 0.009 | 2.771 ± 0.009 | 1.476 ± 0.009 | 2.668 ± 0.006 |
| 32 | 0.475±0.011 | 2.346±0.009 | 1.782±0.018 | 2.820±0.012 |

**Table 6: Ozawa parameters for nonisothermal crystallization of neat PHB**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Melt Crystallization | | | Cold Crystallization | | |
| *T* (oC) | ln** | *m* | *T* (oC) | ln** | *m* |
| 45.0 | 2.044 ± 0.216 | 0.551 ± 0.115 |  |  |  |
| 47.5 | 1.914 ± 0.149 | 0.618 ± 0.079 |  |  |  |
| 50.0 | 1.808 ± 0.106 | 0.700 ± 0.056 | 50.0 | 7.976 ±1.296 | 5.120± 0.600 |
| 52.5 | 1.720 ± 0.112 | 0.790 ± 0.059 | 52.5 | 7.137 ± 0.833 | 4.106 ± 0.386 |
| 55.0 | 1.641 ± 0.172 | 0.914 ± 0.091 | 55.0 | 6.951 ± 0.787 | 3.564 ± 0.364 |
| 57.5 | 1.553 ± 0.274 | 1.043 ± 0.145 | 57.5 | 8.214 ± 0.529 | 3.709 ± 0.229 |
| 60.0 | 1.471 ± 0.437 | 1.204 ± 0.232 | 60.0 | 7.788 ± 0.433 | 3.219 ± 0.187 |
| 62.5 | 1.423 ± 0.721 | 1.428 ± 0.383 | 62.5 | 7.403 ± 0.751 | 2.789 ±0.305 |
| 65.0 | 1.539 ± 1.286 | 1.833 ± 0.683 | 65.0 | 6.658 ± 0.847 | 2.276 ± 0.344 |
| 67.5 | 0.314 ± 0.207 | 1.129 ± 0.126 |  |  |  |
| 70.0 | -0.125 ± 0.298 | 1.204 ± 0.182 |  |  |  |
| 72.5 | -0.675 ± 0.516 | 1.319 ± 0.316 |  |  |  |
| 75.0 | -1.217 ± 1.110 | 1.630 ± 0.679 |  |  |  |

**Table 7: Ozawa parameters for nonisothermal crystallization of PHB/0.5% CB**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Melt Crystallization | | | Cold Crystallization | | |
| *T* (oC) | ln** | *m* | *T* (oC) | ln** | *m* |
|  |  |  | 55.0 | 8.605 ± 2.662 | 4.086 ± 0.942 |
|  |  |  | 57.5 | 9.466 ± 1.576 | 4.008 ± 0.558 |
| 60.0 | 4.735 ± 0.775 | 1.709 ± 0.359 | 60.0 | 17.871 ± 5.032 | 6.805 ± 1.678 |
| 62.5 | 4.418 ± 0.704 | 1.676 ± 0.326 | 62.5 | 15.296 ± 2.888 | 5.576 ± 0.963 |
| 65.0 | 4.338 ± 0.719 | 1.740 ± 0.333 | 65.0 | 15.085 ± 1.925 | 5.240 ± 0.642 |
| 67.5 | 4.356 ± 0.749 | 1.853 ± 0.347 | 67.5 | 15.777 ± 3.058 | 5.234 ± 0.970 |
| 70.0 | 4.420 ± 0.782 | 1.997 ± 0.362 | 70.0 | 15.372 ± 2.577 | 4.926 ± 0.818 |
| 72.5 | 4.509 ± 0.829 | 2.168 ± 0.384 |  |  |  |
| 75.0 | 4.618 ± 0.900 | 2.367 ± 0.417 |  |  |  |
| 77.5 | 4.805 ± 1.006 | 2.625 ± 0.466 |  |  |  |
| 80.0 | 5.160 ± 1.186 | 2.992 ± 0.549 |  |  |  |
| 82.5 | 5.737 ± 1.514 | 3.509 ± 0.701 |  |  |  |
| 85.0 | 6.912 ± 2.302 | 4.400 ± 1.066 |  |  |  |
| 87.5 | 4.168 ± 0.474 | 3.077 ± 0.239 |  |  |  |
| 90.0 | 4.622 ± 0.723 | 3.642 ± 0.366 |  |  |  |
| 92.5 | 5.815 ± 1.510 | 4.720 ± 0.764 |  |  |  |

**Table 8: Ozawa parameters for nonisothermal crystallization of PHB/1% CB**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Melt Crystallization | | | Cold Crystallization | | |
| *T* (oC) | ln** | *m* | *T* (oC) | ln** | *m* |
|  |  |  | 52.5 | 14.279 ± 3.612 | 7.347 ± 1.467 |
|  |  |  | 55.0 | 11.882 ± 1.673 | 5.838 ± 0.680 |
|  |  |  | 57.5 | 11.489 ± 1.112 | 5.311 ± 0.451 |
| 60.0 | 4.624 ± 0.214 | 1.847 ± 0.093 | 60.0 | 14.747 ± 2.144 | 6.399 ± 0.806 |
| 62.5 | 4.727 ± 0.207 | 1.991 ± 0.900 | 62.5 | 13.613 ± 1.412 | 5.648 ± 0.531 |
| 65.0 | 4.924 ± 0.262 | 2.184 ± 0.113 | 65.0 | 15.251 ± 1.168 | 5.931 ± 0.413 |
| 67.5 | 5.235 ± 0.378 | 2.438 ± 0.163 | 67.5 | 18.924 ± 2.823 | 7.083 ± 0.941 |
| 70.0 | 5.678 ± 0.566 | 2.769 ± 0.244 | 70.0 | 16.681 ± 1.618 | 6.054 ± 0.540 |
| 72.5 | 6.322 ± 0.879 | 3.216 ± 0.380 | 72.5 | 15.945 ± 0.972 | 5.588 ± 0.324 |
| 75.0 | 7.367 ± 1.462 | 3.882 ± 0.632 |  |  |  |
| 77.5 | 9.501 ± 2.788 | 5.119 ± 1.205 |  |  |  |
| 80.0 | 6.056 ± 0.439 | 3.582 ± 0.205 |  |  |  |
| 82.5 | 6.895 ± 0.827 | 4.221 ± 0.387 |  |  |  |
| 85.0 | 8.582 ± 1.656 | 5.334 ± 0.775 |  |  |  |
| 87.5 | 13.088 ± 3.970 | 7.974 ± 1.857 |  |  |  |

**Table 9: Ozawa parameters for nonisothermal crystallization of PHB/5% CB**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Melt Crystallization | | | | | Cold Crystallization | | | | | |
| *T* (oC) | ln** | *m* | | *T* (oC) | | ln** | | *m* | |
|  |  | |  | | 57.5 | | 21.329 ±7.614 | | 7.966 ±2.416 | |
|  |  | |  | | 60.0 | | 17.207 ±4.063 | | 6.241 ±1.289 | |
|  |  | |  | | 62.5 | | 16.605 ±2.942 | | 5.772 ±0.933 | |
| 65.0 | 5.492 ±0.345 | | 2.020 ±0.137 | | 65.0 | | 16.883 ±2.176 | | 5.627 ±0.690 | |
| 67.5 | 5.474 ±0.380 | | 2.120 ±0.151 | | 67.5 | | 20.978 ± 0.000 | | 6.655 ± 0.000 | |
| 70.0 | 5.649 ±0.447 | | 2.303 ±0.178 | | 70.0 | | 20.406 ± 0.000 | | 6.316 ± 0.000 | |
| 72.5 | -0.301 ±0.018 | | 1.109 ±0.016 | | 72.5 | | 19.425 ± 0.000 | | 5.880 ± 0.000 | |
| 75.0 | 5.550 ±0.596 | | 2.558 ±0.253 | | 75.0 | | 18.878 ± 0.000 | | 5.587 ± 0.000 | |
| 77.5 | 5.918 ±0.826 | | 2.890 ±0.350 | |  | |  | |  | |
| 80.0 | 3.841 ±0.441 | | 2.034 ±0.221 | |  | |  | |  | |
| 82.5 | 3.682 ±0.518 | | 2.153 ±0.260 | |  | |  | |  | |
| 85.0 | 3.605 ±0.551 | | 2.345 ±0.277 | |  | |  | |  | |
| 87.5 | 3.553 ±0.610 | | 2.599 ±0.306 | |  | |  | |  | |
| 90.0 | -0.493 ±0.069 | | 1.148 ±0.031 | |  | |  | |  | |
| 92.5 | 2.764 ±0.699 | | 2.798 ±0.390 | |  | |  | |  | |

**Table 10: Ozawa parameters for nonisothermal crystallization of PHB/10% CB**

|  |  |  |
| --- | --- | --- |
| Melt Crystallization | | |
| *T* (oC) | ln** | *m* |
| 75.0 | 6.672 ± 0.988 | 2.678 ± 0.394 |
| 77.5 | 6.772 ± 0.810 | 2.870 ± 0.323 |
| 80.0 | 6.997 ± 0.693 | 3.124 ± 0.276 |
| 82.5 | 7.293 ± 0.612 | 3.431 ± 0.244 |
| 85.0 | 7.672 ± 0.601 | 3.809 ± 0.239 |
| 87.5 | 8.391 ± 0.820 | 4.387 ± 0.327 |
| 90.0 | 7.611 ± 0.782 | 4.302 ± 0.338 |
| 92.5 | 8.402 ± 0.935 | 5.017 ± 0.404 |
| 95.0 | 8.672 ± 2.138 | 5.539 ± 1.000 |

**Table 11: Mo parameters for nonisothermal crystallization of neat PHB**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *x*  (%) | Melt Crystallization | | Cold Crystallization | |
| ln*F* | ** | ln*F* | ** |
| 10 | 2.193 ±0.050 | 0.489 ±0.052 | 1.734 ±0.050 | 1.761 ±0.099 |
| 20 | 2.357 ±0.033 | 0.510 ±0.029 | 2.115 ±0.026 | 1.710 ±0.066 |
| 30 | 2.459 ±0.018 | 0.515 ±0.014 | 2.329 ±0.020 | 1.678 ±0.054 |
| 40 | 2.537 ±0.008 | 0.521 ±0.006 | 2.483 ±0.019 | 1.655 ±0.051 |
| 50 | 2.605 ±0.004 | 0.529 ±0.003 | 2.610 ±0.021 | 1.639 ±0.054 |
| 60 | 2.668 ±0.005 | 0.538 ±0.003 | 2.725 ±0.026 | 1.631 ±0.060 |
| 70 | 2.730 ±0.011 | 0.547 ±0.007 | 2.840 ±0.032 | 1.636 ±0.069 |
| 80 | 2.794 ±0.019 | 0.555 ±0.011 | 2.972 ±0.045 | 1.648 ±0.087 |
| 90 | 2.865 ±0.031 | 0.559 ±0.017 | 3.158 ±0.075 | 1.668 ±0.127 |

**Table 12: Mo parameters for nonisothermal crystallization of PHB/0.5%CB**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *x*  (%) | Melt Crystallization | | Cold Crystallization | |
| ln*F* | ** | ln*F* | ** |
| 10 | 2.470±0.072 | 1.012±0.083 | 1.791 ±0.899 | 1.507 ±0.900 |
| 20 | 2.763± 0.080 | 1.075±0.082 | 1.994 ±0.614 | 1.722 ±0.903 |
| 30 | 2.960 ±0.086 | 1.113±0.081 | 2.151 ±0.464 | 1.879 ±0.854 |
| 40 | 3.116±0.091 | 1.138±0.079 | 2.295 ±0.363 | 2.003 ±0.823 |
| 50 | 3.251±0.095 | 1.156±0.077 | 2.437 ±0.286 | 2.106 ±0.803 |
| 60 | 3.370±0.099 | 1.165± 0.076 | 2.582 ±0.223 | 2.199 ±0.794 |
| 70 | 3.484±0.103 | 1.169± 0.074 | 2.738 ±0.168 | 2.291 ±0.798 |
| 80 | 3.600± 0.109 | 1.169±0.073 | 2.923 ±0.117 | 2.386 ±0.806 |
| 90 | 3.738 ± 0.124 | 1.158± 0.077 | 3.178 ±0.093 | 2.490 ±0.852 |

**Table 13: Mo parameters for nonisothermal crystallization of PHB/1%CB**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *x*  (%) | Melt Crystallization | | Cold Crystallization | |
| ln*F* | ** | ln*F* | ** |
| 10 | 2.432±0.148 | 0.925± 0.159 | 2.032± 0.251 | 1.531±0.381 |
| 20 | 2.727± 0.168 | 1.006± 0.156 | 2.370±0.141 | 1.588± 0.318 |
| 30 | 2.935± 0.177 | 1.056± 0.149 | 2.578±0.093 | 1.633±0.283 |
| 40 | 3.105± 0.184 | 1.093± 0.143 | 2.738± 0.068 | 1.677±0.261 |
| 50 | 3.252± 0.192 | 1.122 ± 0.140 | 2.878± 0.054 | 1.721± 0.247 |
| 60 | 3.385± 0.199 | 1.144± 0.138 | 3.012±0.050 | 1.769±0.240 |
| 70 | 3.513±0.205 | 1.160± 0.134 | 3.152± 0.055 | 1.826± 0.246 |
| 80 | 3.646± 0.215 | 1.171± 0.132 | 3.313± 0.072 | 1.889± 0.273 |
| 90 | 3.802±0.240 | 1.175±0.138 | 3.530± 0.121 | 1.952± 0.357 |

**Table 14: Mo parameters for nonisothermal crystallization of PHB/5%CB**

|  |  |  |
| --- | --- | --- |
| *x*  (%) | Melt Crystallization | |
| ln*F* | ** |
| 10 | 2.471± 0.039 | 0.988± 0.043 |
| 20 | 2.740± 0.044 | 1.040± 0.044 |
| 30 | 2.916± 0.049 | 1.072± 0.045 |
| 40 | 3.055± 0.054 | 1.097± 0.046 |
| 50 | 3.177± 0.059 | 1.119± 0.048 |
| 60 | 3.291± 0.064 | 1.137± 0.049 |
| 70 | 3.403± 0.069 | 1.152± 0.051 |
| 80 | 3.525±0.076 | 1.166± 0.053 |
| 90 | 3.683± 0.086 | 1.181±0.056 |

**Table 15: Mo parameters for nonisothermal crystallization of PHB/10%CB**

|  |  |  |
| --- | --- | --- |
| *x*  (%) | Melt Crystallization | |
| ln*F* | ** |
| 10 | 2.433 ±0.064 | 1.199 ±0.087 |
| 20 | 2.735 ±0.064 | 1.253 ±0.081 |
| 30 | 2.930 ±0.065 | 1.286 ±0.075 |
| 40 | 3.084 ±0.065 | 1.310 ±0.070 |
| 50 | 3.216 ±0.065 | 1.330 ±0.066 |
| 60 | 3.339 ±0.064 | 1.346 ±0.062 |
| 70 | 3.459 ±0.065 | 1.359 ±0.059 |
| 80 | 3.583 ±0.066 | 1.362 ±0.056 |
| 90 | 3.726 ±0.071 | 1.350 ±0.055 |