**Supplementary Materials**

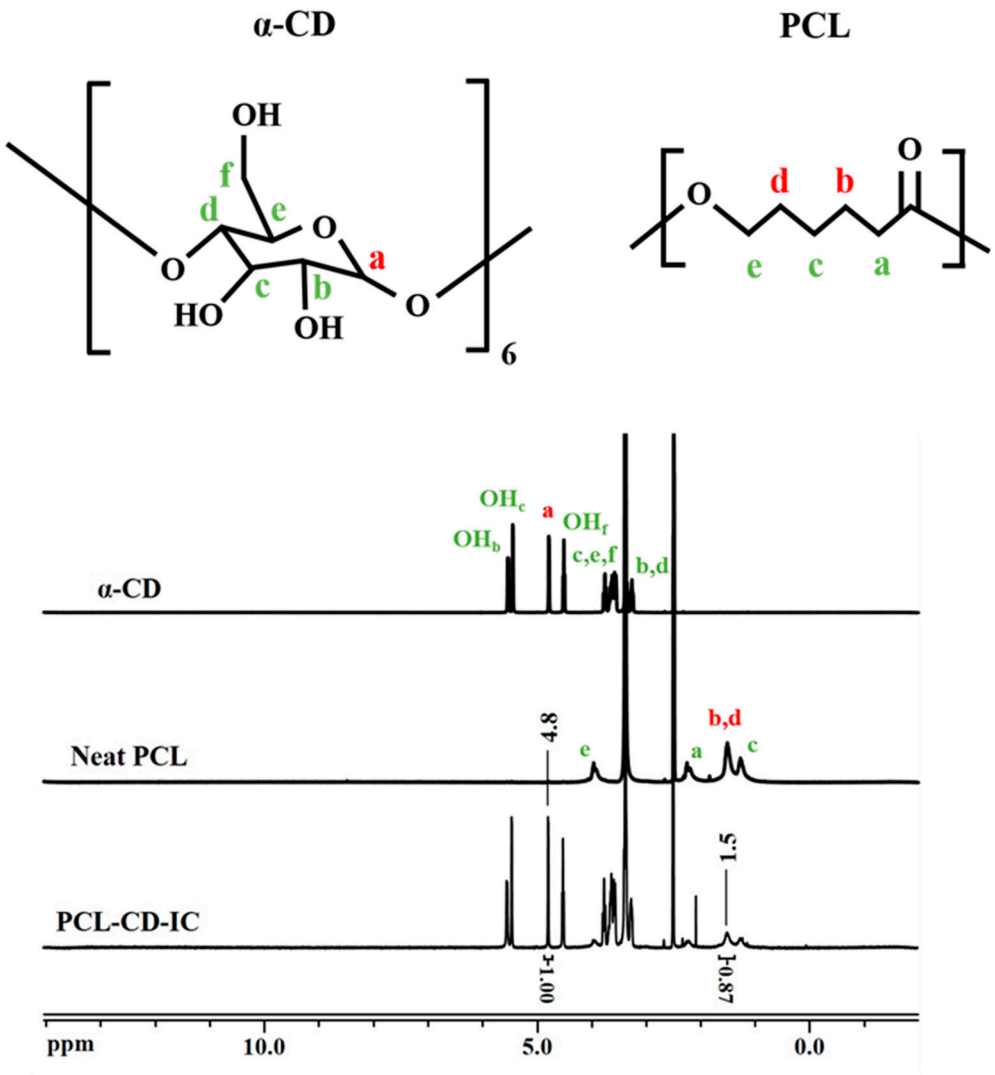


**Figure S1.** $^{1}$H NMR spectra of $\alpha$-CD, neat PCL and PCL-CD-IC.

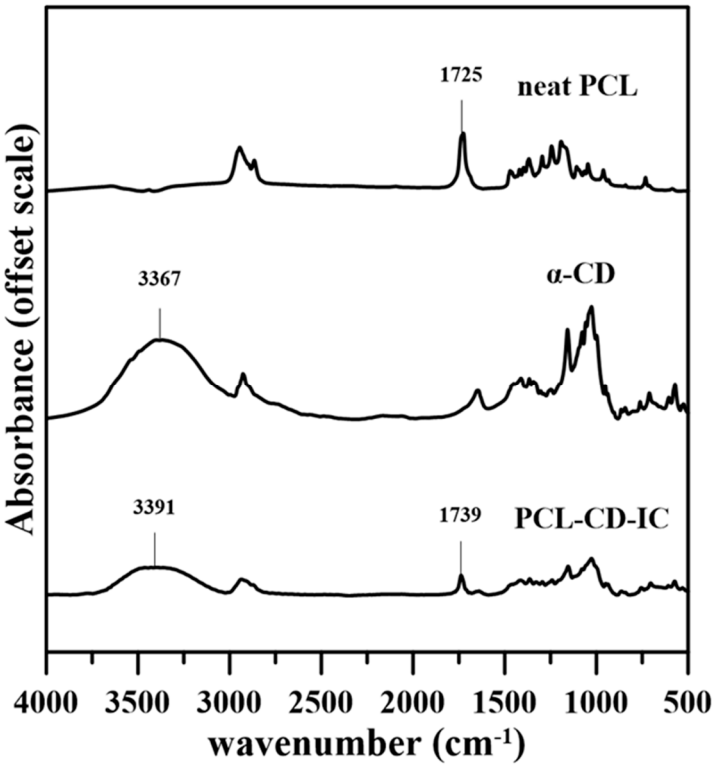


**Figure S2.** FTIR spectra of neat PCL, $\alpha$-CD and PCL-CD-IC.

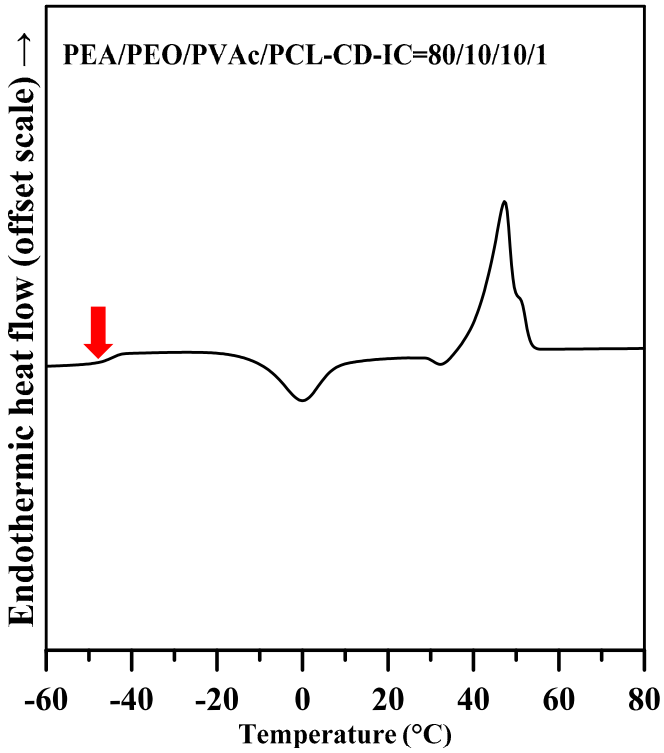


**Figure S3.** DSC thermal scan of PEA/PEO/PVAc/PCL-CD-IC=80/10/10/1 composite. The arrow indicates the single $T_g$ of the composite, demonstrating the miscibility of the composite.

**The analysis method of isothermal crystallization using the Avrami equation**

The isothermal crystallization results from neat PEA to quaternary PEA/PEO/PVAc/PCL-CD-IC composites were analyzed by the Avrami equation [1,2] showing below:

$$1 - X_t = exp(-kt^n) \quad (1)$$

In equation (1), $X_t$ is relative crystallinity at a given time t, k is the crystallization rate constant, and n is the Avrami exponent. The relevant kinetic parameters can be evaluated through the logarithmic form of the Avrami equation, such as equation (2):

$$log[-ln(1 - X_t)] = logk + nlogt \quad (2)$$

Equation (2) shows that when $log[-ln(1-X_t)]$ has a linear relationship with log(t), k and n are the slope and intercept of the plot, respectively. Furthermore, the crystallization half-time ($t_{0.5}$) can be obtained by equation (3):

$$t_{0.5} = \left(\frac{ln2}{k}\right)^{\frac{1}{n}} \quad (3)$$

It should be noted that $t_{0.5}$ can be defined as the time when the crystallization proceeds to 50%. In general, is the crystallization rate is related to the reciprocal of $t_{0.5}$. When the crystallization rate is higher, $1/t_{0.5}$ is larger.

## References


1. Avrami, M. Kinetics of phase change. II transformation-time relations for random distribution of nuclei. *J. Chem. Phys.* **1940**, *8*, 212–224.
2. Avrami, M. Granulation, phase change, and microstructure kinetics of phase change. III. *J. Chem. Phys.* **1941**, **9**, 177–184.