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Supplementary information

Supramolecular Gel-functionalized Polymer Film with Tunable Optical Activity

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Materials and instrumentations

Poly(ethylene-co-vinylacetate) (vinyl acetate: 40 wt%) was purchased from Aldrich. Ruthenium Tetroxide was purchased from TAAB. *N*',*N*''-didodecyl-L-glutamideand pyrene lipid (***g*$_L$-Pyr**) and *N*',*N*''-didodecyl-D-glutamideand pyrene lipid (***g*$_D$-Pyr**) were synthesized by the previously reported procedure. UV-visible, CD and fluorescence spectra were measured with V-560 (JASCO), J725 (JASCO) and FP-8600 (JASCO), respectively. TEM images were observed with JEM-2100 (JEOL). TMA was measured by TMA/SS7100 (HITACHI High-Tech) with following conditions, 10 °C/min and 20 mN. DSC thermogram was measured by DSC 6100 (Seiko Instruments, Inc.) with following conditions, nitrogen flow, at a heating rate 10 °C/min.

Preparation of the thermal treated film: The prepared films were heated in oven at each temperature for 10 min, and then cooled at 25 °C. All spectroscopy were measured at 25 °C.

Preparation of the TEM sample: The TEM sample of ***g*$_L$-Pyr**-incorporated EVA films were prepared by following method.

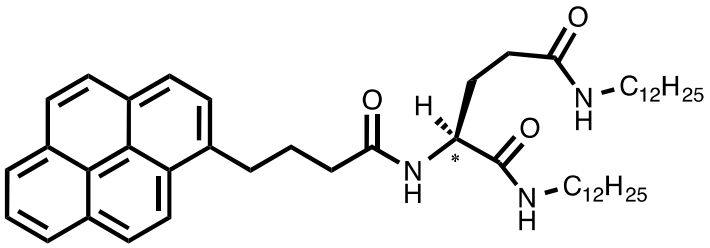
(1) ***g*$_L$-Pyr** (0.042 wt%) and EVA (5 wt%) dissolved toluene/ethyl acetate (1 : 1) mixed solution was prepared.

(2) The mixed solution (10 μL) was casted onto the water surface that was filled in container (surface area = 230 cm^2) and dried at 25 °C for 5 min.

(3) The obtained polymer thin film was put onto the elastic carbon-coated cupper grid, and it stained by vapor of ruthenium tetroxide (RuO_4) for 2 h.

(4) For investigation of thermal responsiveness, films on cupper grid were heated at each temperature (110 °C and 150 °C) for 10 min.

The optical property and thermal responsiveness of TEM samples have been investigated by CD measurement. The TEM samples showed similar CD signal and thermal responsiveness as films that were prepared on glass substrate for spectroscopy.



Scheme S1. Chemical structure of ***g*$_L$-Pyr**.

Table S1. Optical properties of g_L-**Pyr**-incorporated EVA films

	State	CD intensity /mdeg (nm)	g_{abs}	Abs_{max} /nm	FL_{max} /nm	ϕ_{FL}
Without thermal-treatment	I	56 (354)	1.6×10^{-3}	352	449	0.36
Thermal-treatment at 110 ˚C	II	-85 (356)	-2.4×10^{-3}	351	452	0.39
Thermal-treatment at 150 ˚C	III	4 (355)	1.1×10^{-4}	350	451	0.43

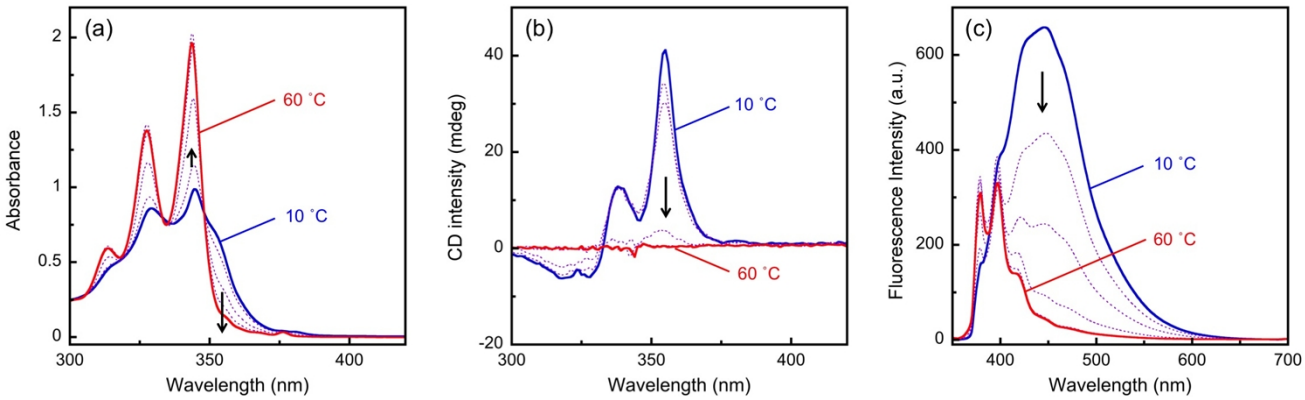


Figure S1. Temperature dependent (a) UV-vis, (b) CD and (c) fluorescence spectra of g_L-**Pyr** (0.5 mM) in a toluene/ethylacetate (1 : 1) mixture. The arrows indicate temperature increase from 10 to 60 ˚C. Excitation wavelength = 350 nm.

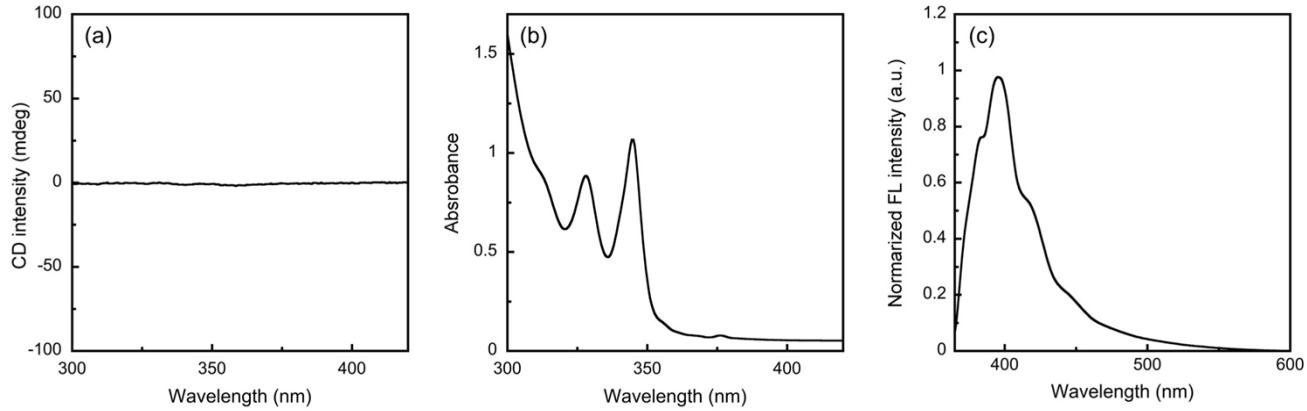


Figure S2. (a) CD spectrum, (b) UV-vis spectrum and (c) fluorescence spectrum of pyrene butyric acid (0.3 wt%) incorporated EVA films. Excitation wavelength = 350 nm.

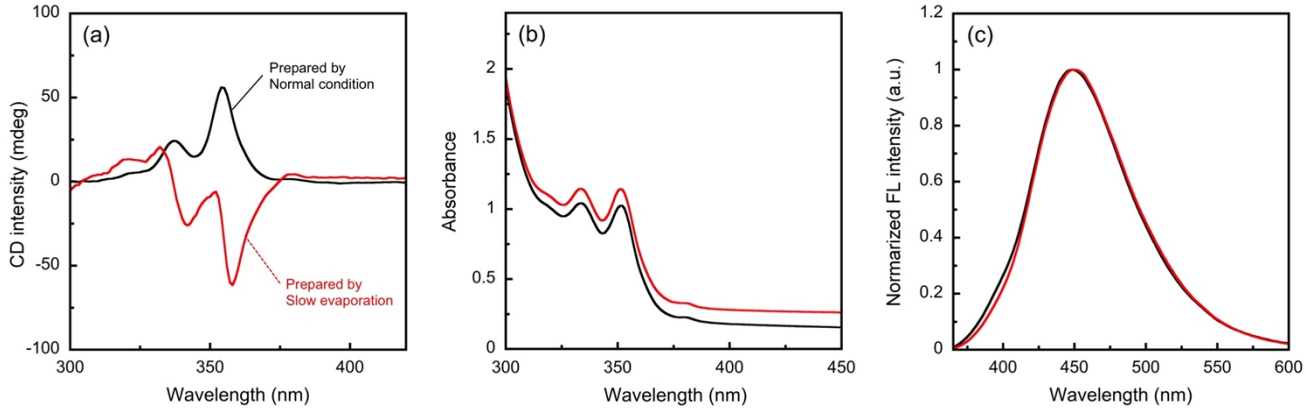


Figure S3. (a) CD spectra, (b) UV-vis spectra and (c) fluorescence spectra of g_L**-Pyr** (0.84 wt%) incorporated EVA films. Excitation wavelength = 350 nm. Slow evaporated film was prepared in toluene/ethyl acetate vapor at 25 ˚C.

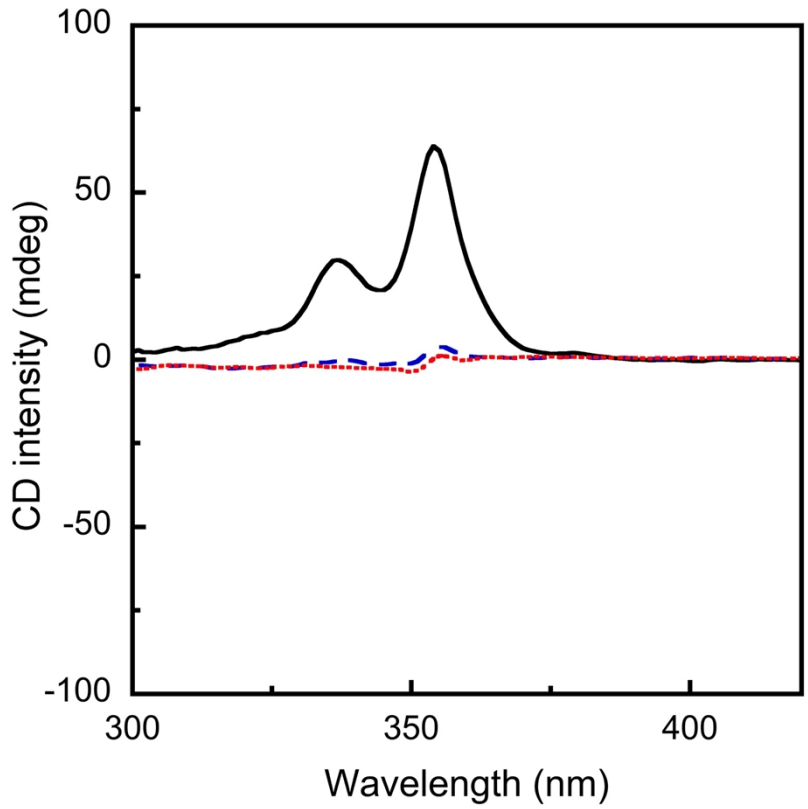


Figure S4. CD spectra of g_L**-Pyr** (0.84 wt%) incorporated EVA films. Black solid line: without thermal treatment, blue dashed line: thermal treatment at 150 ˚C for 10 min, and red dotted line: thermal treatment at 150 ˚C for 10 min, and then maintained at 110 ˚C for 10 min.

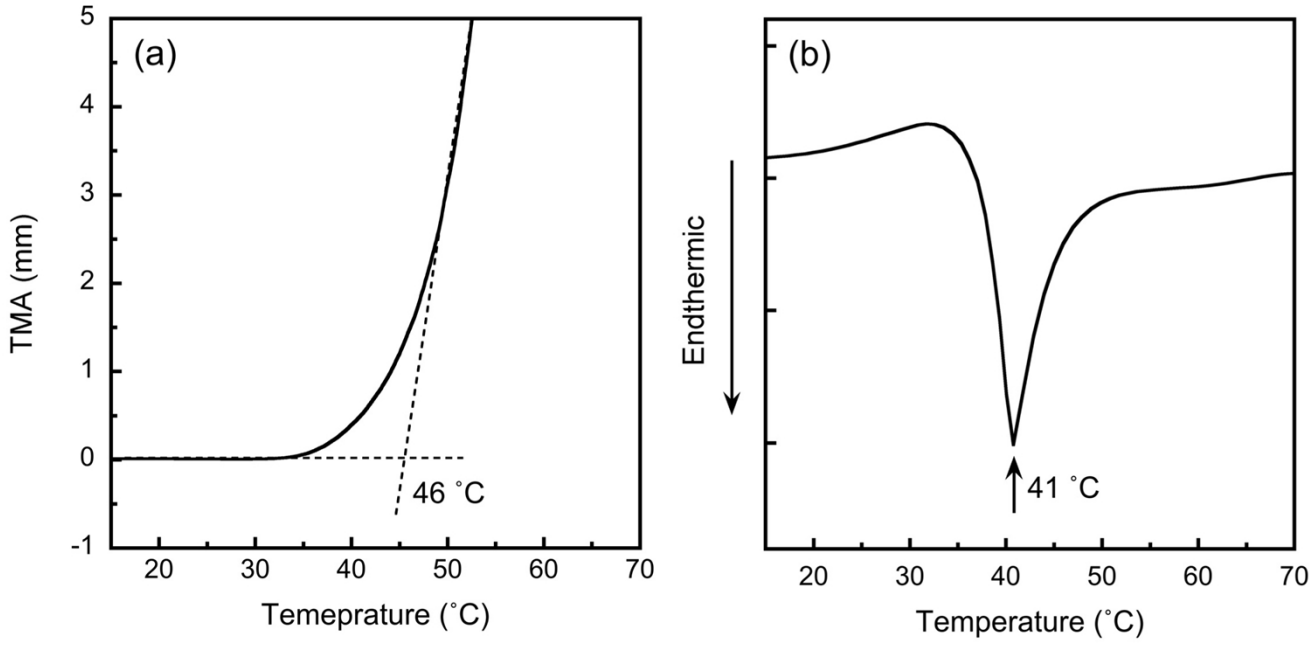


Figure S5. (a) TMA and (b) DSC curves of g_L**-Pyr** (0.84 wt%) incorporated EVA film.

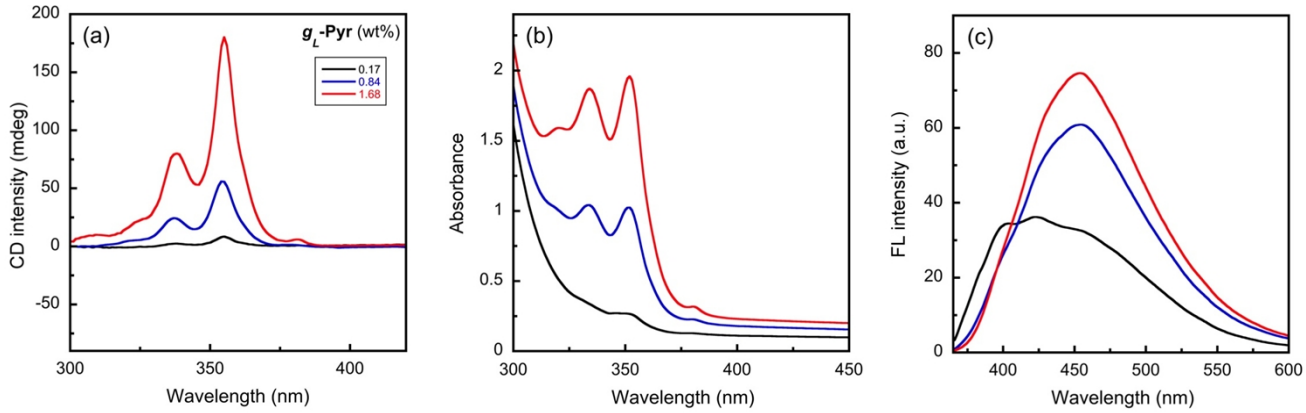


Figure S6. (a) CD spectra, (b) UV-vis spectra and (c) fluorescence spectra of g_L**-Pyr** (black line: 0.17 wt%, blue line: 0.84 wt%, red line: 1.68 wt%) incorporated EVA films. Excitation wavelength = 350 nm.

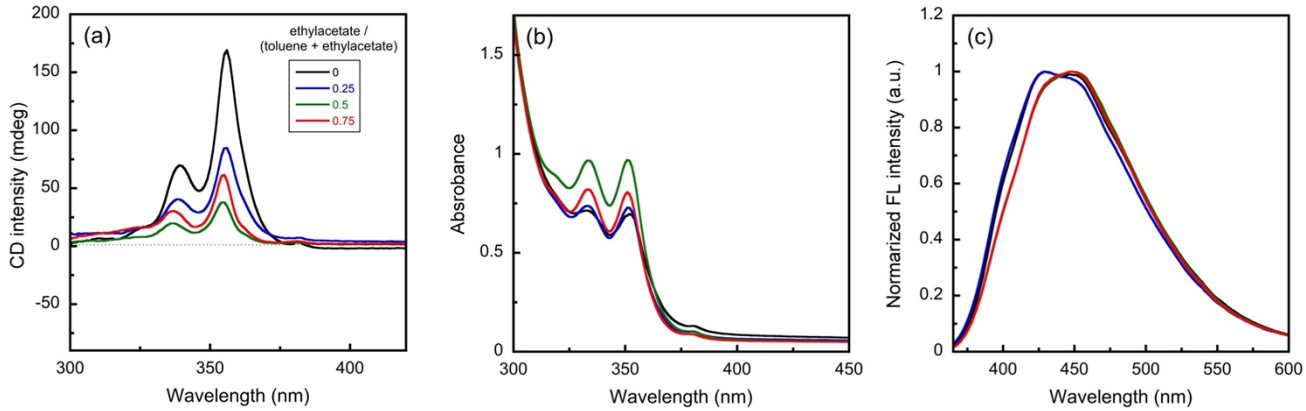


Figure S7. (a) CD spectra, (b) UV-vis spectra and (c) fluorescence spectra of g_L-**Pyr** (0.84 wt%) incorporated EVA films. Films were prepared from g_L-**Pyr** dissolved toluene/ethyl acetate mixture. Excitation wavelength = 350 nm.

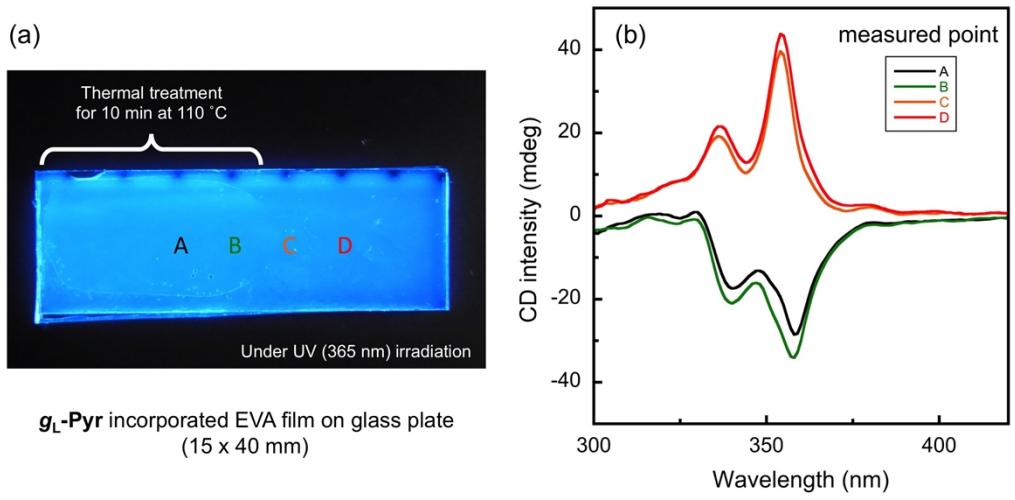


Figure S8 (a) Photo image and (b) CD spectra of g_L-**Pyr** (0.84 wt%) incorporated EVA film with partial thermal-treatment at 110 ˚C.

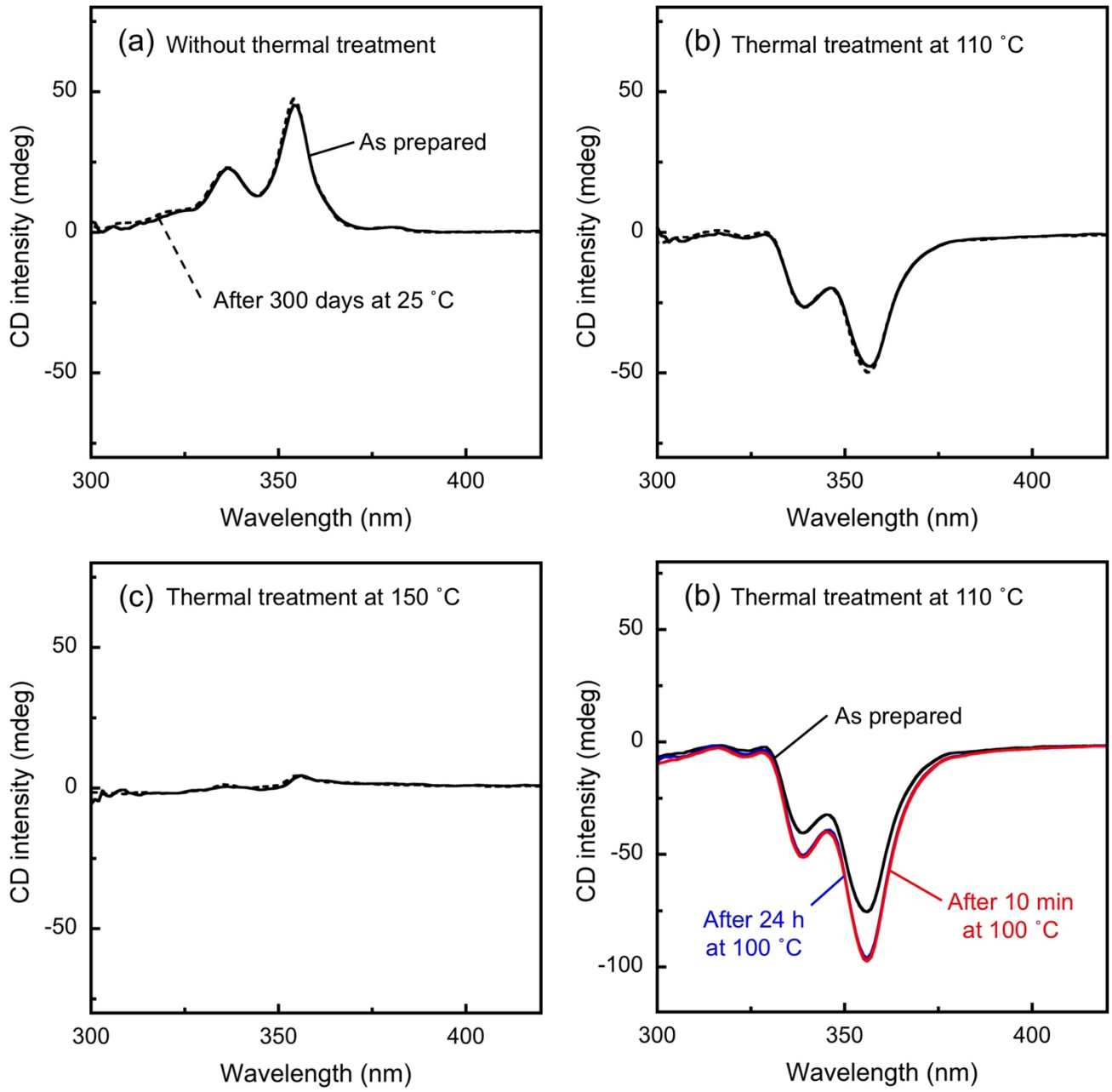


Figure S9. CD spectra of g_L**-Pyr** (0.84 wt%) incorporated EVA films. Thermal stability test at 25 ˚C; (a) film without thermal-treatment, (b) film with thermal-treatment at 110 ˚C, and (c) film with thermal-treatment at 150 ˚C. Thermal stability test at 100 ˚C; (d) film with thermal-treatment at 110 ˚C.