

**EVA films loaded with Layered Double Hydroxide (LDH) modified with methacrylic anion:
effect of the nanohybrid filler on the photodegradation phenomena**

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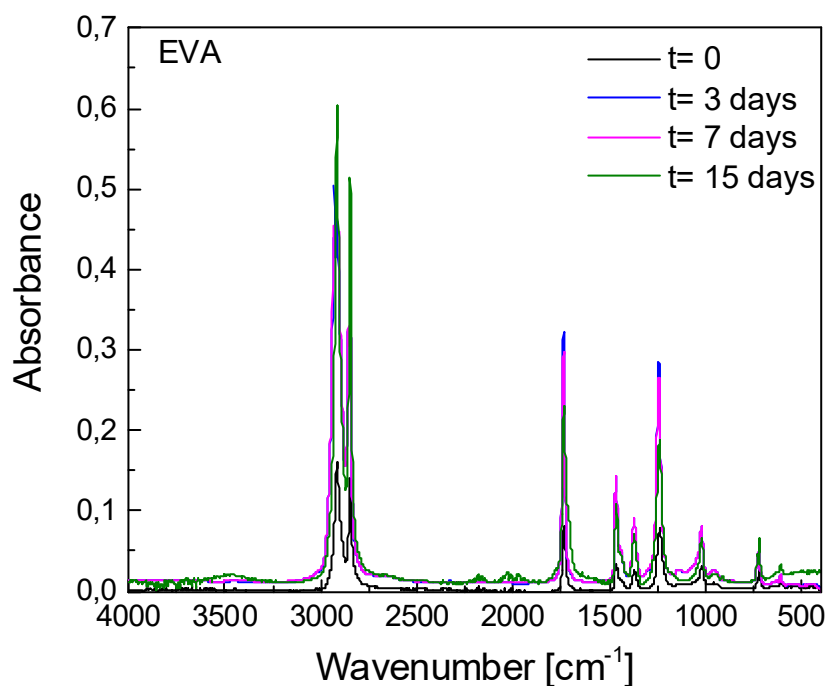


Figure S.I. 1: ATR infrared spectrum of EVA at different exposure time.

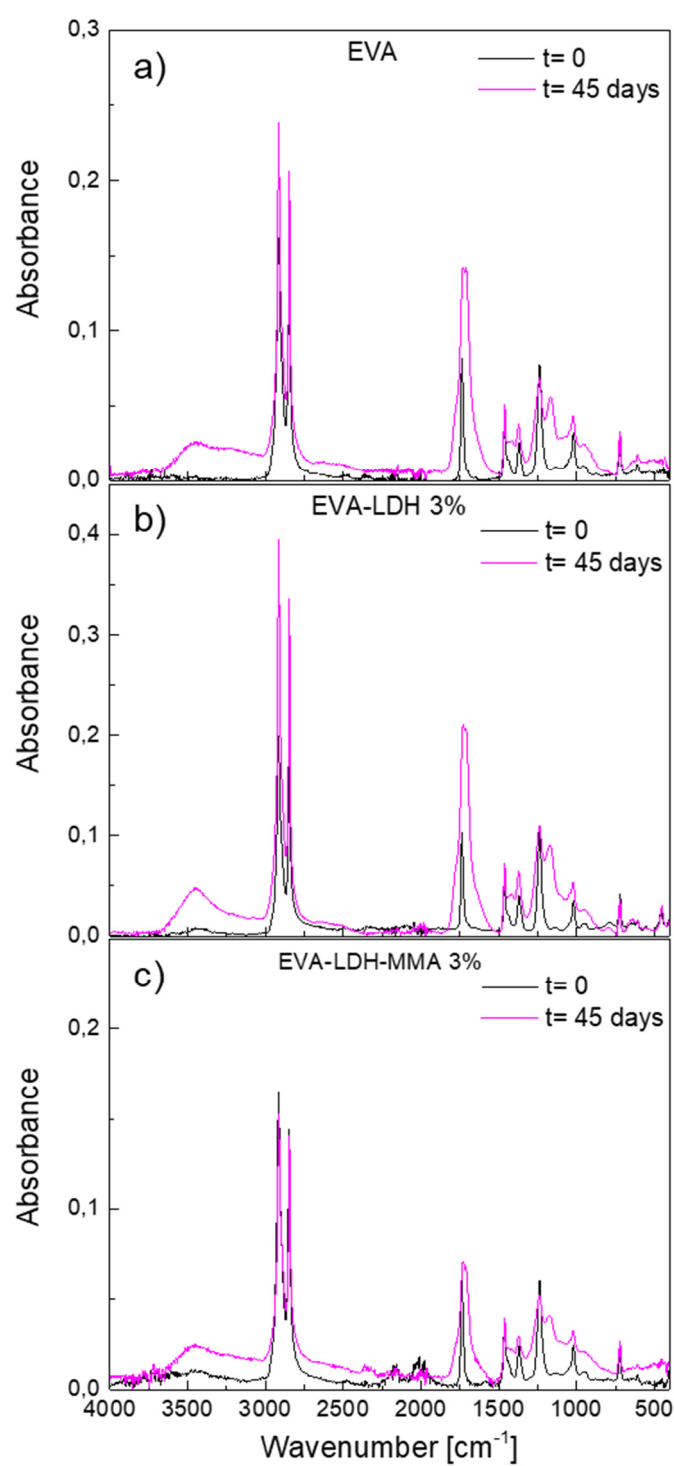


Figure S.I. 2: ATR infrared spectra of EVA (a), EVA-LDH 3% (b) and EVA-LDH-MMA 3% (c) as prepared, and after 45 days of exposure time.

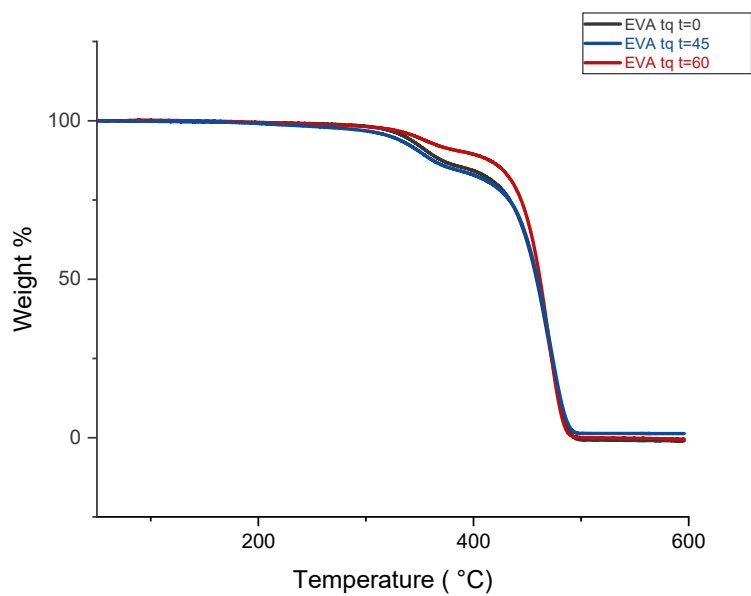


Figure S.I. 3 TGA profiles of EVA TQ as prepared, and after 45 and 60 days of exposure time.

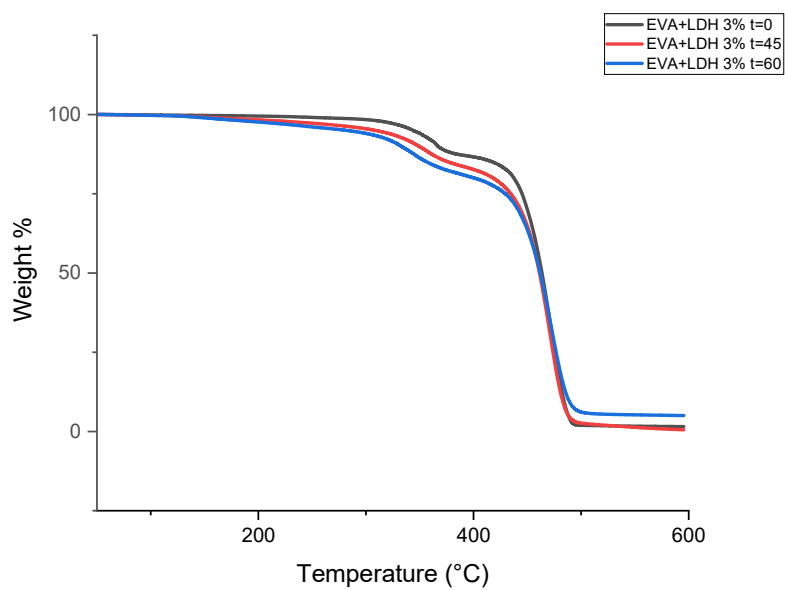


Figure S.I.:4 TGA profiles of EVA + LDH 3% as prepared, and after 45 and 60 days of exposure time.

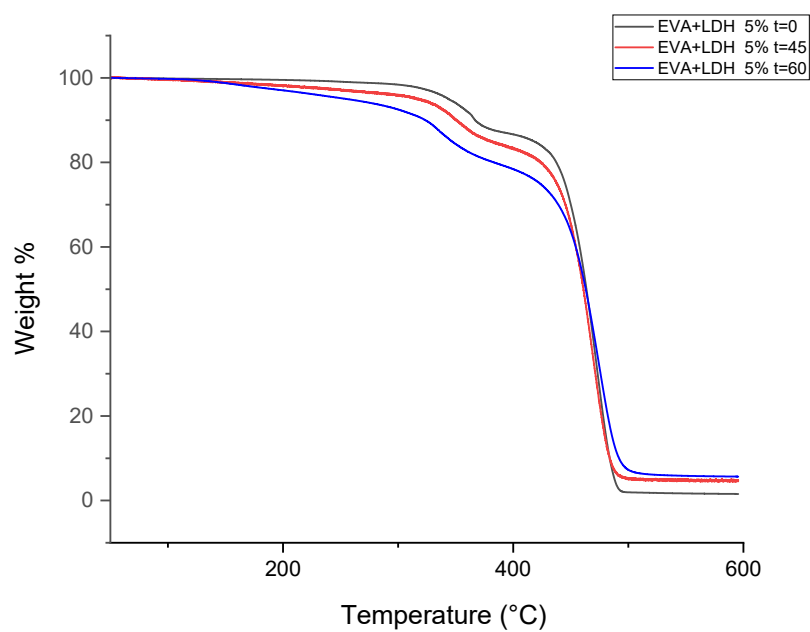


Figure S.I.:5 TGA profiles of EVA + LDH 5% as prepared, and after 45 and 60 days of exposure time.

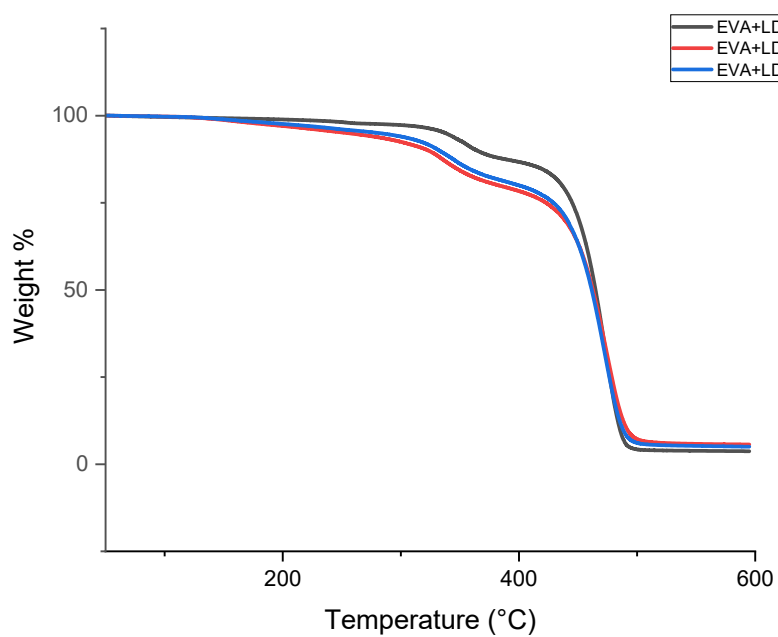


Figure S.I.:6 TGA profiles of EVA + LDH 10% as prepared, and after 45 and 60 days of exposure time.

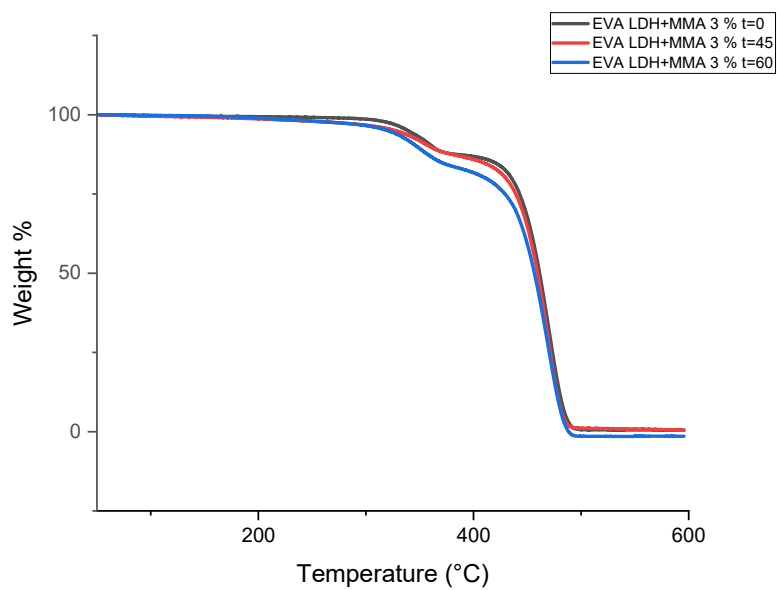


Figure S.I.:7 TGA profiles of EVA + LDH +MMA 3% as prepared, and after 45 and 60 days of exposure time.

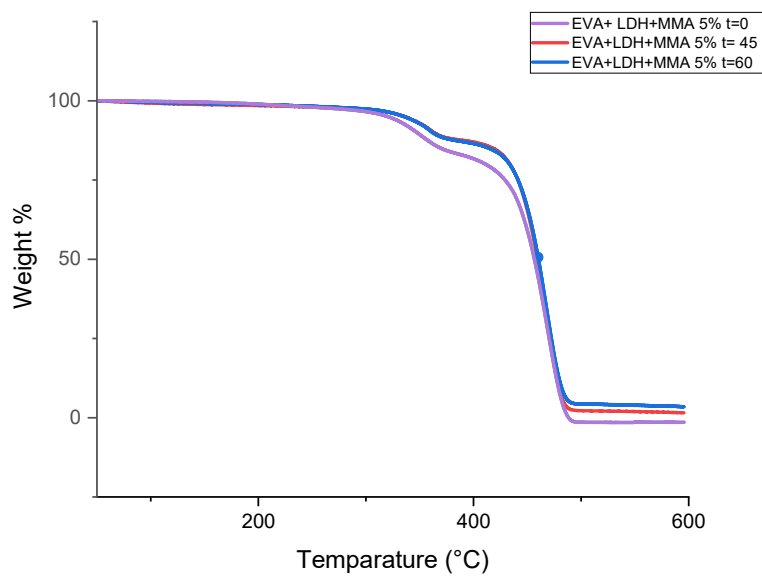


Figure S.I.:8 TGA profiles of EVA + LDH +MMA 5% as prepared, and after 45 and 60 days of exposure time.

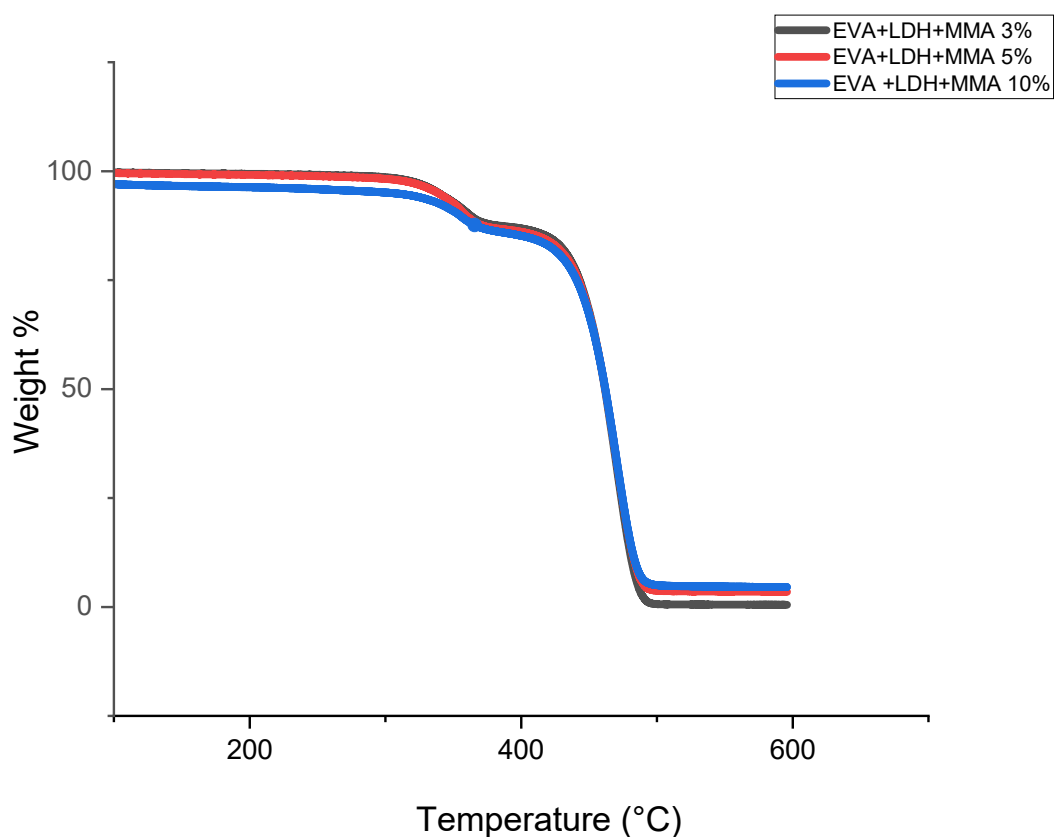


Figure S.I.:9 TGA profiles of EVA + LDH +MMA 3, 5 and 10%

TGA measurements on EVA+LDH+MMA 3%, EVA+LDH+MMA 10%, EVA+LDH 3% and EVA+LDH 10% were performed in presence of N₂ using a thermogravimetric apparatus (TA Instruments Q500) under air flow (60 mL min⁻¹) with a heating rate of 10 °C min⁻¹ from 50 to 600 °C. The obtained results were summarized in Tables as a follow.

Table S.I. 1: Onset temperature of degradation, temperature at maximum rate of decomposition and residual masses of EVA+LDH+MMA 3% at 0, 45 and 60 days of exposure.

Sample	$T_{95} (^{\circ}\text{C})^a$	$T_{peak} (^{\circ}\text{C})^b$	<i>Residue at $T=600^{\circ}\text{C}$</i>
<i>Eva+LDH+MMA 3% t=0</i>	323	471	0.8
<i>Eva+LDH+MMA 3% t=45</i>	318	470	0.5
<i>Eva+LDH+MMA 3% t=60</i>	316	469	0.1

(a) Temperature at wt -5% of weight loss

(b) Temperature at the maximum derivate of weight loss

(c) % of residue at 600°C

Table S.I. 2: Onset temperature of degradation, temperature at maximum rate of decomposition and residual masses of EVA+LDH+MMA 10% at 0, 45 and 60 days of exposure.

Sample	$T_{95} (^{\circ}\text{C})^a$	$T_{peak} (^{\circ}\text{C})^b$	Residue at $T=600^{\circ}\text{C}$
<i>Eva+LDH+MMA 10% t=0</i>	336	470	1.6
<i>Eva+LDH+MMA 10% t=45</i>	328	467	1.8
<i>Eva+LDH+MMA 10% t=60</i>	325	467	2.3

- (a) Temperature at wt -5% of weight loss
(b) Temperature at the maximum derivate of weight loss
(c) % of residue at 600°C

Table S.I.: 3 Onset temperature of degradation, temperature at maximum rate of decomposition and residual masses of EVA+LDH 3% at 0, 45 and 60 days of exposure.

Sample	$T_{95} (^{\circ}\text{C})^a$	$T_{peak} (^{\circ}\text{C})^b$	Residue at $T=600^{\circ}\text{C}$
<i>Eva+LDH 3% t=0</i>	305	473	0.8
<i>Eva+LDH 3% t=45</i>	299	471	0.5
<i>Eva+LDH3% t=60</i>	275	467	2.0

- (a) Temperature at wt -5% of weight loss
(b) Temperature at the maximum derivate of weight loss
(c) % of residue at 600°C

Table S.I.: 4 Onset temperature of degradation, temperature at maximum rate of decomposition and residual masses of EVA+LDH 10% at 0, 45 and 60 days of exposure.

Sample	$T_{95} (^{\circ}\text{C})^a$	$T_{peak} (^{\circ}\text{C})^b$	Residue at $T=600^{\circ}\text{C}$
<i>Eva+LDH 10% t=0</i>	338	473	3.7
<i>Eva+LDH 10% t=45</i>	334	474	5.6
<i>Eva+LDH10% t=60</i>	325	472	5.1

- (a) Temperature at wt -5% of weight loss
(b) Temperature at the maximum derivate of weight loss
(c) % of residue at 600°C

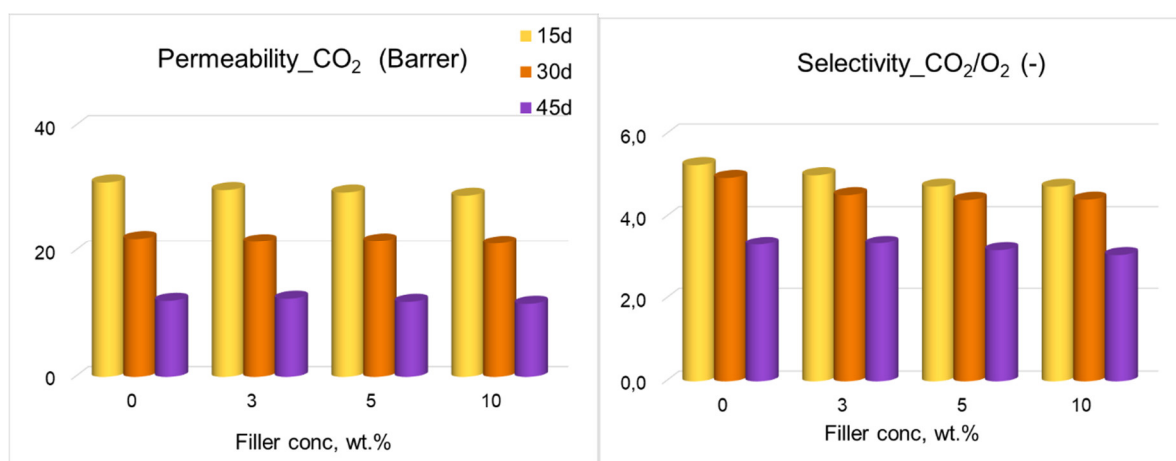


Figure S.I. 10: CO₂ Permeability and CO₂/O₂ selectivity for the films based on EVA with increasing loadings of LDH and photo-exposed (15 d, 30 d and 45 d).

Table S.I.: 5 CO₂ Diffusion coefficient extracted from values in Figures 8

Treatment time	LDH concentration, %	CO ₂ Diffusion coefficient, 10 ⁻¹² m ² /s
0 days	0	35.6
	3	32.1
	5	28.3
	10	17.1
15 days	0	36.5
	3	32.8
	5	24.2
	10	16.8
30 days	0	28.0
	3	28.6
	5	22.0
	10	12.6