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ASSESSMENT OF AN INTRINSIC KINETIC MODEL FOR TiO_2-FORMIC ACID PHOTODEGRADATION USING LEDS AS RADIATION SOURCE

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SUPPORTING INFORMATION

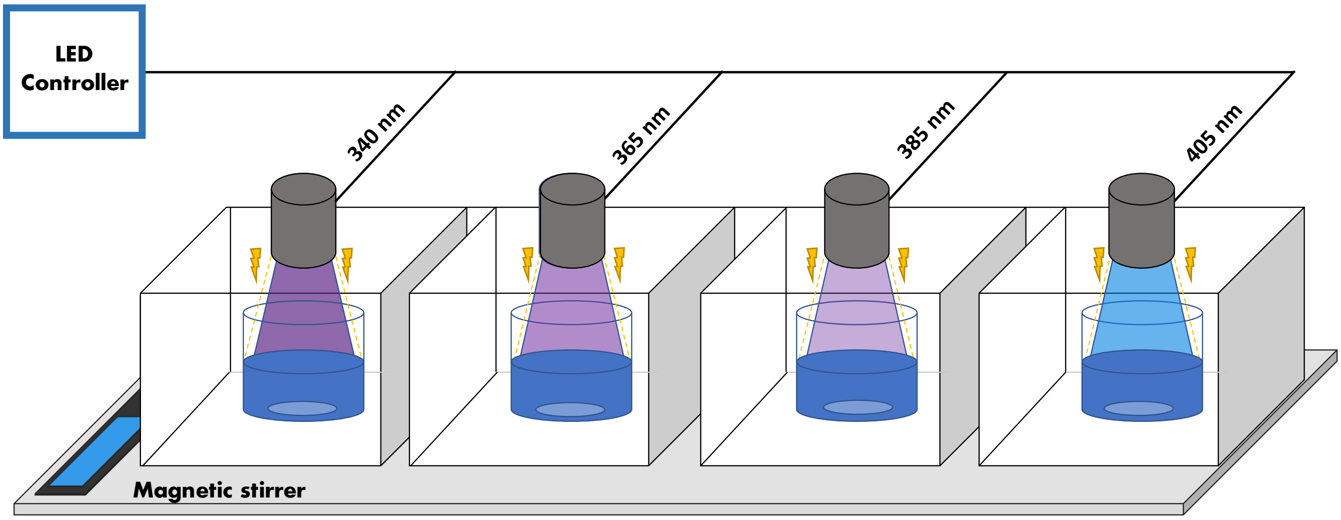

Figure S1. Scheme of the experimental setup employed in the photocatalytic degradation of HCOOH.

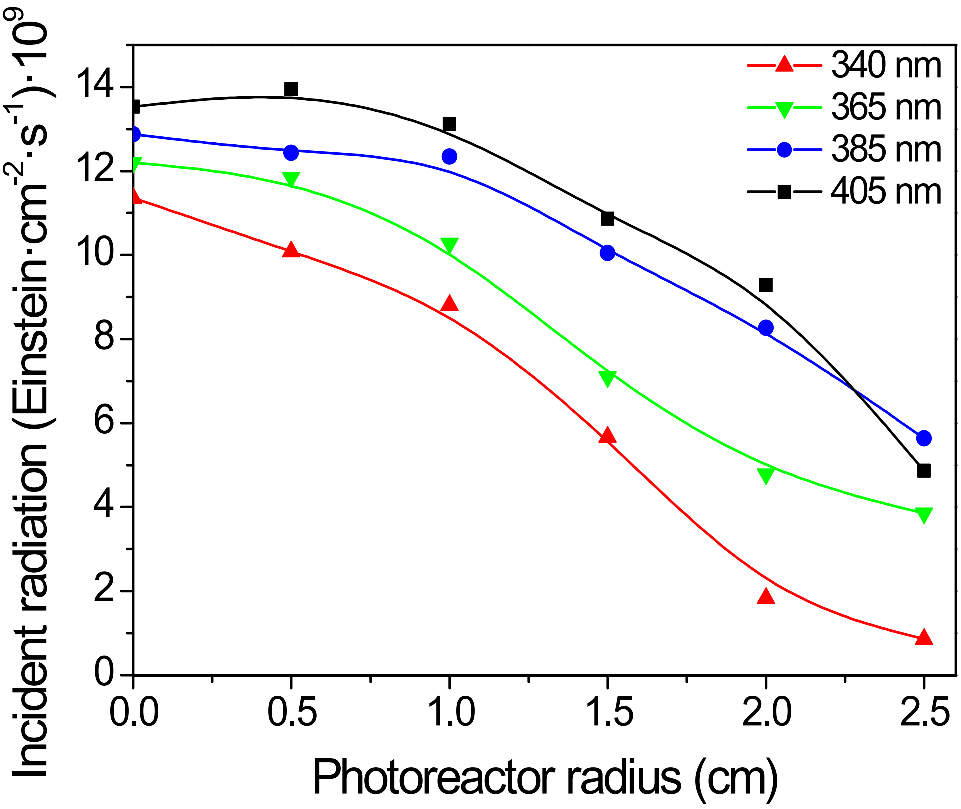

Figure S2. Incident radiation measured along the radius of the photoreactor.

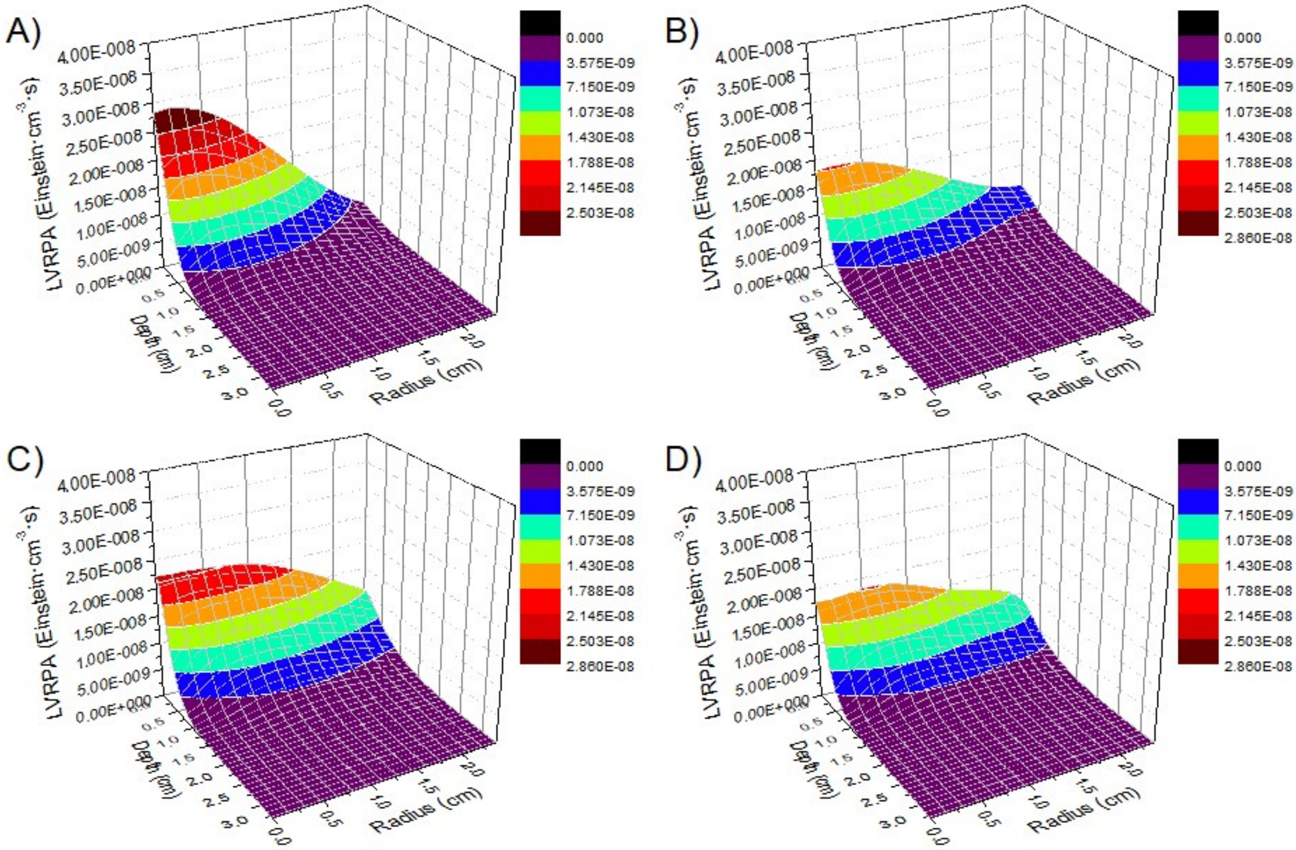

Figure S3. LVRPA profiles estimated for the different LEDs using 250 mg·L^{-1} of K7000 photocatalyst and the highest studied average inlet radiation: A) 340 nm, B) 365 nm, C) 385 nm and D) 405 nm.

Table S1. Observed initial molar reaction rate of HCOOH photodegradation $\langle r_{HCOOH}(x,r,t_0)\rangle_{V_R}$ with K7000 estimated under different operating conditions.

LED 340 nm				LED 365 nm			
$[TiO_2]$ ($mg\cdot L^{-1}$)	Average Incident radiation ($Einstein\cdot cm^{-2}\cdot s^{-1}$) $\cdot 10^9$	$\langle r_{HCOOH}(x,r,t_0)\rangle_{V_R}$ ($mmol\cdot L^{-1}\cdot min^{-1}$) $\mathbf{\cdot 10^3}$	r^2	$[TiO_2]$ ($mg\cdot L^{-1}$)	Average Incident radiation ($Einstein\cdot cm^{-2}\cdot s^{-1}$) $\cdot 10^9$	$\langle r_{HCOOH}(x,r,t_0)\rangle_{V_R}$ ($mmol\cdot L^{-1}\cdot min^{-1}$) $\mathbf{\cdot 10^3}$	r^2
250	6.26	8.02	0.998	250	4.94	11.51	0.994
250	3.77	5.59	0.995	250	4.17	8.66	0.998
250	1.90	2.11	0.990	250	2.11	5.30	0.998
125	6.26	7.33	0.992	125	4.94	9.73	0.999
50	6.26	5.66	0.995	50	4.94	3.88	0.994
LED 385 nm				**LED 405 nm**			
$[TiO_2]$ ($mg\cdot L^{-1}$)	Average Incident radiation ($Einstein\cdot cm^{-2}\cdot s^{-1}$) $\cdot 10^9$	$\langle r_{HCOOH}(x,r,t_0)\rangle_{V_R}$ ($mmol\cdot L^{-1}\cdot min^{-1}$) $\mathbf{\cdot 10^3}$	r^2	$[TiO_2]$ ($mg\cdot L^{-1}$)	Average Incident radiation ($Einstein\cdot cm^{-2}\cdot s^{-1}$) $\cdot 10^9$	$\langle r_{HCOOH}(x,r,t_0)\rangle_{V_R}$ ($mmol\cdot L^{-1}\cdot min^{-1}$) $\mathbf{\cdot 10^3}$	r^2
250	10.42	5.87	0.997	250	9.93	1.61	0.997
250	7.00	3.49	0.999	250	6.81		
250	2.67	1.60	0.995	250	3.01		
125	10.42	4.10	0.997	125	9.93	0.42	0.873
50	10.42	1.78	0.998	50	9.93	0.41	0.968

Table S2. Observed initial molar reaction rate of HCOOH photodegradation $\langle r_{HCOOH}(x,r,t_0)\rangle_{V_R}$ with K7050 estimated under different operating conditions.

LED 340 nm				**LED 365 nm**			
$[TiO_2]$ ($mg\cdot L^{-1}$)	Average Incident radiation ($Einstein\cdot cm^{-2}\cdot s^{-1}$) $\cdot 10^9$	$\langle r_{HCOOH}(x,r,t_0)\rangle_{V_R}$ ($mmol\cdot L^{-1}\cdot min^{-1}$) $\mathbf{\cdot 10^3}$	r^2	$[TiO_2]$ ($mg\cdot L^{-1}$)	Average Incident radiation ($Einstein\cdot cm^{-2}\cdot s^{-1}$) $\cdot 10^9$	$\langle r_{HCOOH}(x,r,t_0)\rangle_{V_R}$ ($mmol\cdot L^{-1}\cdot min^{-1}$) $\mathbf{\cdot 10^3}$	r^2
250	6.26	5.14	0.992	250	4.94	9.12	0.998
250	3.77	4.22	0.993	250	4.17	5.78	0.994
250	1.90	2.79	0.990	250	2.11	5.01	0.998
125	6.26	2.75	0.995	125	4.94	9.07	0.991
50	6.26	2.04	0.995	50	4.94	2.17	0.992
LED 385 nm				**LED 405 nm**			
$[TiO_2]$ ($mg\cdot L^{-1}$)	Average Incident radiation ($Einstein\cdot cm^{-2}\cdot s^{-1}$) $\cdot 10^9$	$\langle r_{HCOOH}(x,r,t_0)\rangle_{V_R}$ ($mmol\cdot L^{-1}\cdot min^{-1}$) $\mathbf{\cdot 10^3}$	r^2	$[TiO_2]$ ($mg\cdot L^{-1}$)	Average Incident radiation ($Einstein\cdot cm^{-2}\cdot s^{-1}$) $\cdot 10^9$	$\langle r_{HCOOH}(x,r,t_0)\rangle_{V_R}$ ($mmol\cdot L^{-1}\cdot min^{-1}$) $\mathbf{\cdot 10^3}$	r^2
250	10.42	6.71	0.991	250	9.93	1.45	0.965
250	7.00	3.94	0.995	250	6.81		
250	2.67	2.82	0.999	250	3.01		
125	10.42	5.18	0.995	125	9.93	0.48	0.966
50	10.42	1.16	0.996	50	9.93	0.44	0.973