



## Supporting Information

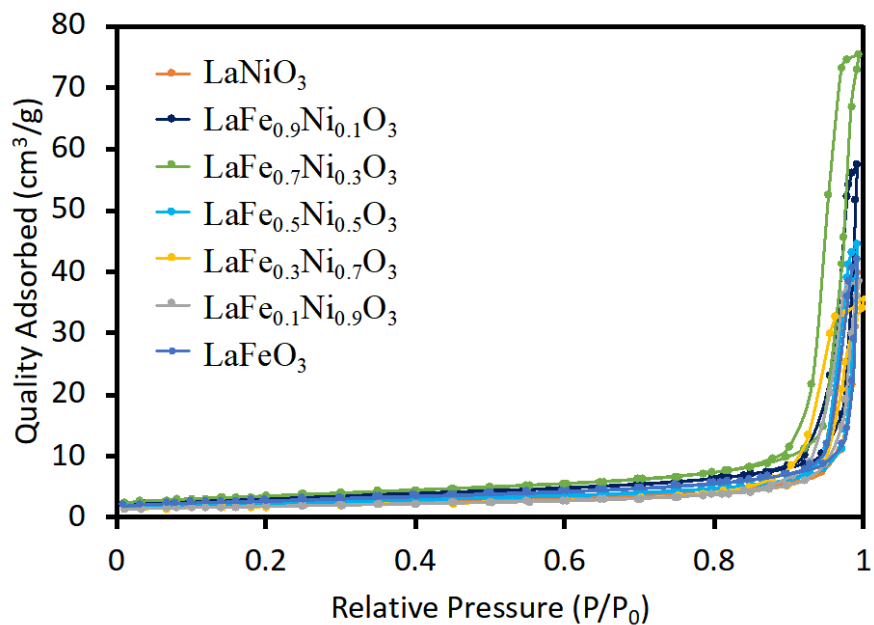
for

### **Solar-light-driven $\text{LaFe}_x\text{Ni}_{1-x}\text{O}_3$ perovskite oxides for photocatalytic Fenton-like reaction to degrade organic pollutants**

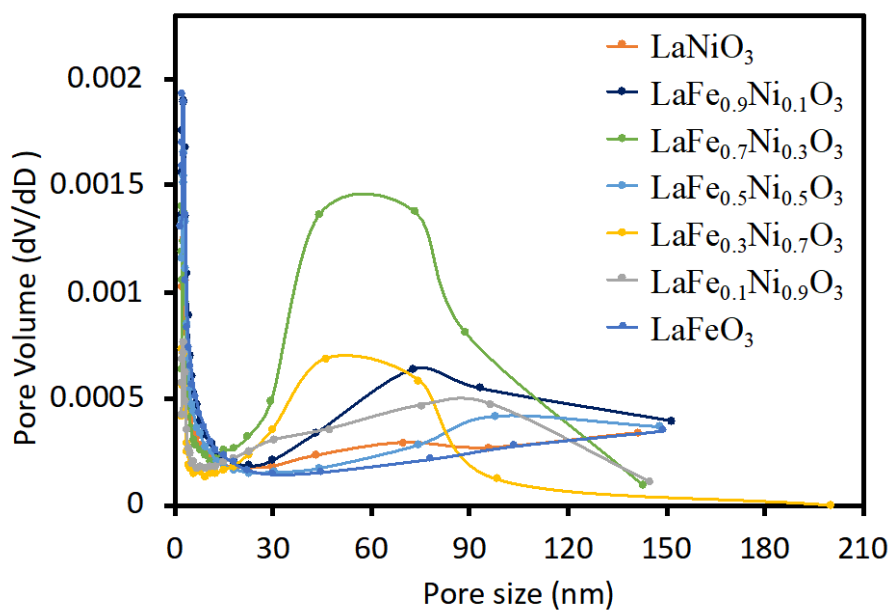
Chao-Wei Huang, Shu-Yu Hsu, Jun-Han Lin, Yun Jhou, Wei-Yu Chen, Kun-Yi Andrew Lin, Yu-Tang Lin and Van-Huy Nguyen

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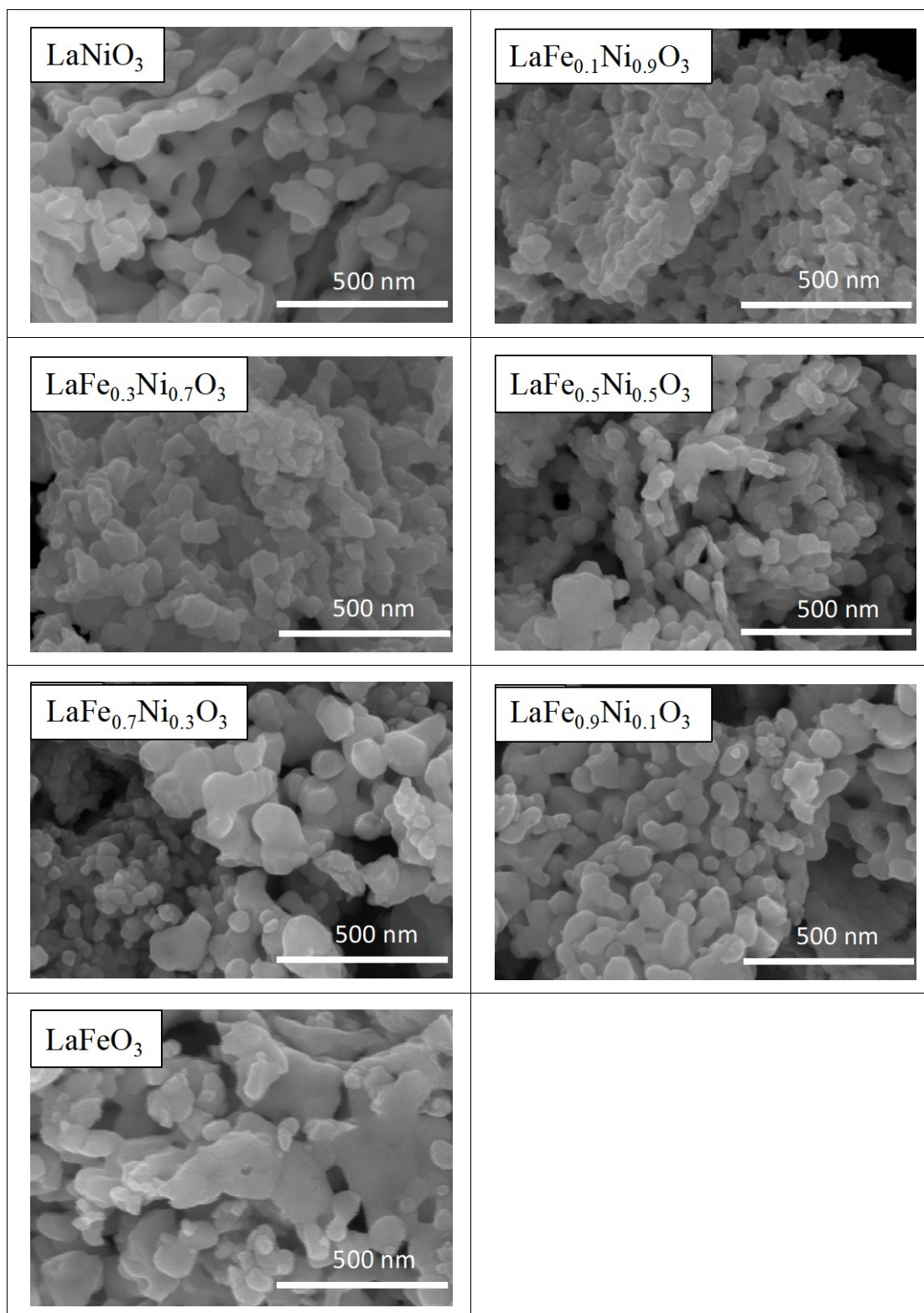
## Additional figures and tables



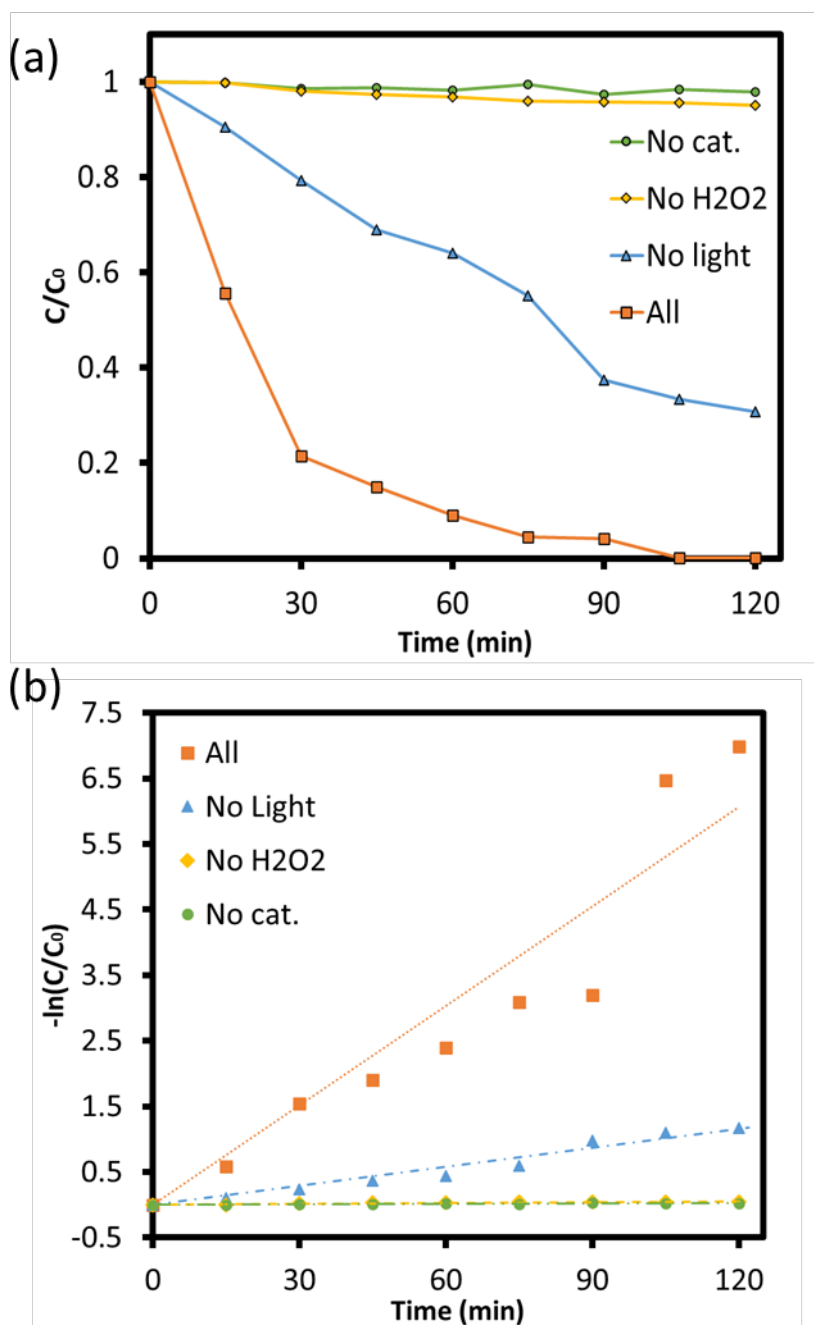
**Figure S1:** The nitrogen adsorption and desorption curves of the samples with different Fe/Ni synthesis ratios at pH 0.



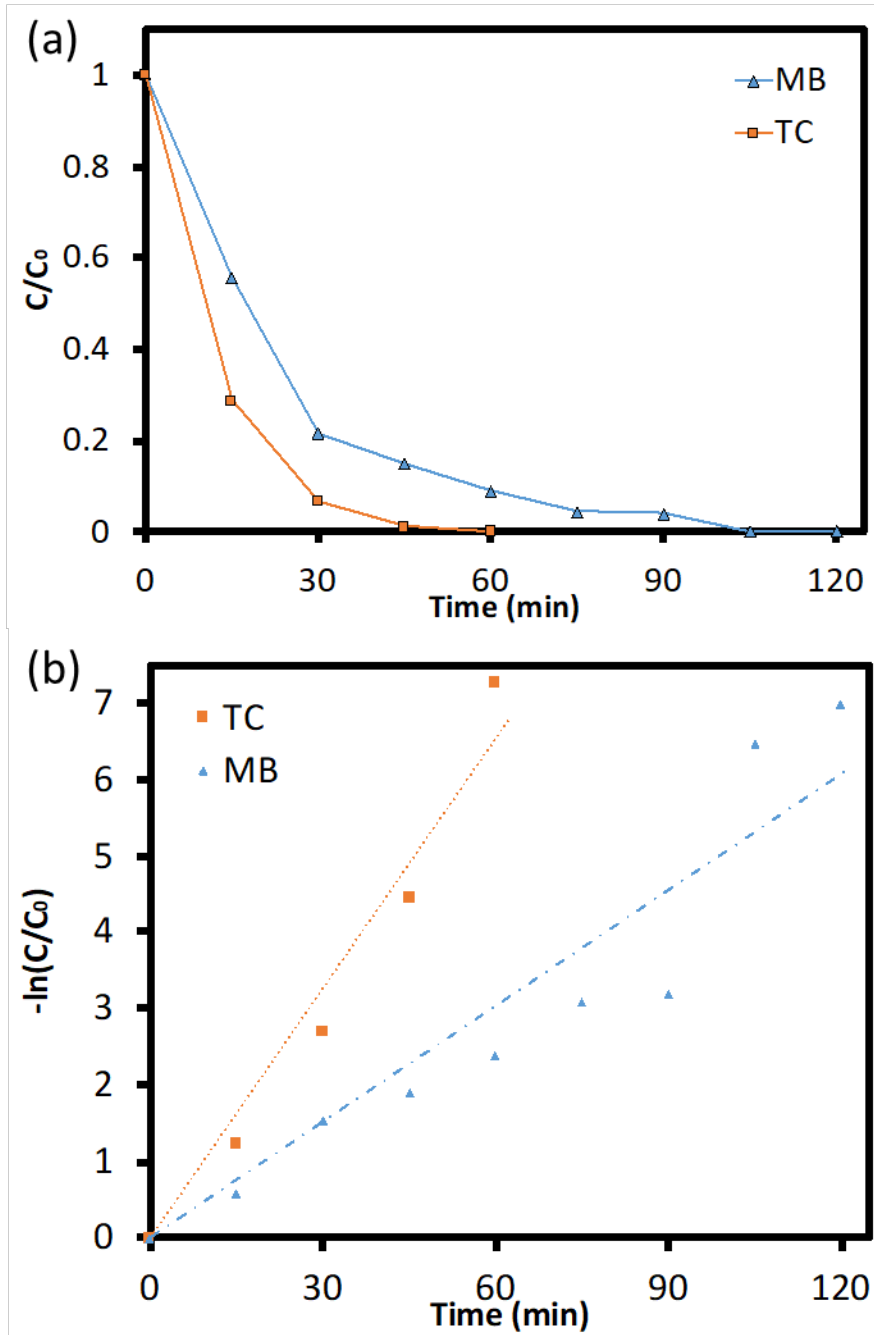
**Figure S2:** Pore size distribution of the samples with different Fe/Ni synthesis ratios.



**Figure S3:** FESEM images of LaFe<sub>x</sub>Ni<sub>1-x</sub>O<sub>3</sub> prepared at pH 7 (at the magnification of 100,000×).



**Figure S4:** (a)  $C/C_0$  and (b) the 1st order kinetic analysis of the photodegradation using  $\text{LaFe}_{0.7}\text{Ni}_{0.3}\text{O}_3$  operating at different controlling conditions.



**Figure S5:** (a)  $C/C_0$  and (b) 1st order kinetic analysis of the MB and TC photodegradation using  $\text{LaFe}_{0.7}\text{Ni}_{0.3}\text{O}_3$  operating at the optimal condition.

**Table S1:** The specific surface area, pore size, and pore volume for the samples with different Fe/Ni ratios.

Samples with Fe/Ni ratios	0/1	1/9	3/7	5/5	7/3	9/1	1/0
Surface Area (m <sup>2</sup> /g)	7.18	6.25	6.17	8.35	12.30	10.79	9.82
Pore Size (nm)	26.73	35.72	34.05	28.49	36.71	29.62	18.33
Pore Volume (cm <sup>3</sup> /g)	0.0480	0.0558	0.0525	0.0595	0.1129	0.0799	0.0450

**Table S2:** The unit cell parameters and cell volume for the samples with different Fe/Ni ratios.

Samples	Cell parameter (Å)			Cell volume (Å <sup>3</sup> )
	a	b	c	
LaFeO <sub>3</sub>	5.592	7.854	5.044	221.530
LaFe <sub>0.9</sub> Ni <sub>0.1</sub> O <sub>3</sub>	5.579	7.828	5.53	241.508
LaFe <sub>0.7</sub> Ni <sub>0.3</sub> O <sub>3</sub>	5.601	7.844	5.545	243.615
LaFe <sub>0.5</sub> Ni <sub>0.5</sub> O <sub>3</sub>	5.537	7.776	5.48	235.945
LaFe <sub>0.5</sub> Ni <sub>0.5</sub> O <sub>3</sub>	5.502		6.762	177.269
LaFe <sub>0.3</sub> Ni <sub>0.7</sub> O <sub>3</sub>	5.511		6.712	176.534
LaFe <sub>0.1</sub> Ni <sub>0.9</sub> O <sub>3</sub>	5.491		6.443	168.232
LaNiO <sub>3</sub>	5.458		6.614	170.627

**Table S3:** The detailed EDS information of various samples with different Fe/Ni ratios.

Sample	Element symbol	Element name	Atomic %	Weight %	Detected Fe/Ni	Designed Fe/Ni
LaNiO <sub>3</sub>	O	Oxygen	40.07	12.62	0	0
	La	Lanthanum	21.63	59.17		
	Ni	Nickel	20.83	24.07		
	C	Carbon	17.48	4.13		
LaFe <sub>0.1</sub> Ni <sub>0.9</sub> O <sub>3</sub>	C	Carbon	40.97	12.91	0.11	0.11
	O	Oxygen	32.54	13.66		
	La	Lanthanum	15.56	56.68		
	Ni	Nickel	9.83	15.13		
	Fe	Iron	1.11	1.62		
LaFe <sub>0.3</sub> Ni <sub>0.7</sub> O <sub>3</sub>	C	Carbon	38.28	11.65	0.41	0.43
	O	Oxygen	34.04	13.8		
	La	Lanthanum	16.53	58.2		
	Ni	Nickel	7.88	11.73		
	Fe	Iron	3.26	4.62		
LaFe <sub>0.5</sub> Ni <sub>0.5</sub> O <sub>3</sub>	O	Oxygen	38.44	11.67	0.97	1.00
	La	Lanthanum	24.73	65.19		
	C	Carbon	19.66	4.48		
	Ni	Nickel	8.7	9.69		
	Fe	Iron	8.46	8.97		
LaFe <sub>0.7</sub> Ni <sub>0.3</sub> O <sub>3</sub>	O	Oxygen	42.08	12.51	2.31	2.33
	La	Lanthanum	25.49	65.78		

	C	Carbon	15.01	3.35		
	Fe	Iron	12.15	12.61		
	Ni	Nickel	5.27	5.75		
LaFe <sub>0.9</sub> Ni <sub>0.1</sub> O <sub>3</sub>	O	Oxygen	53.02	22.03	8.75	9.00
	C	Carbon	20.51	6.4		
	La	Lanthanum	15.35	55.37		
	Fe	Iron	9.98	14.47		
	Ni	Nickel	1.14	1.74		
LaFeO <sub>3</sub>	O	Oxygen	37.46	15.75	-	-
	C	Carbon	36.02	11.37		
	La	Lanthanum	15.57	56.82		
	Fe	Iron	10.95	16.06		



**Table S4:** The comparison of photodegradation performance over various LaFeO<sub>3</sub>-related samples.

Catalyst	H <sub>2</sub> O <sub>2</sub> concentration	Light source	MB concentration	performance	Ref.
Cds/LaFeO <sub>3</sub>	4.0 mM	400 W Hg lamp	25 mg/L	180 min 95%	[1]
LaFeO <sub>3</sub> /TiO <sub>2</sub> NTAs	N/A	500 W tungsten halogen lamp	10 mg/L	120 min 70%	[2]
AgCl/Ag/LaFeO <sub>3</sub>	N/A	400 W Xenon lamp	20 mg/L	100 min 98%	[3]
LaFeO <sub>3</sub> /g-C <sub>3</sub> N <sub>4</sub>	N/A	3 W LED	5 mg/L	120 min 95%	[4]
LaFe <sub>0.7</sub> Ni <sub>0.3</sub> O <sub>3</sub>	4.0 mM	300 W Xenon lamp	10 mg/L	120 min 100%	This work

## References

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