

Supporting information for the paper

Ordered arrays of nanorods obtained by solid-liquid reactions of LaOCl crystals.

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Table S1. Results of elemental analysis for the LaOCl solids before and after catalytic tests ^a.

Sample	La % wt.	Cl % wt.	Akl, % wt ^b	La/Cl, at
Initial LaOCl	74.8	17.9	0.03%>	1.03
Initial LaOCl after IPA test	72.1	17.6	Nd	1.05
HCl - etched LaOCl	72.7	17.3	0.03% >	1.08
HCl-etched after IPA test	74.3	17.4	Nd	1.09
KOH-treated LaOCl	72.1	16.8	0.12 % K	1.09
KOH-treated after IPA test	71.2	16.6	Nd	1.09
H2O-treated LaOCl	75.2	0.22	0.03% >	-
H2O-treated after IPA test	72.6	0.19	Nd	-

Calculated values for pure LaOCl : La – 72.9 % wt.; Cl – 18.6 % wt.

^b – Alkali metal is Li, unless other indicated

In the LaOCl treated with phosphate, the La content was 53.1 % wt. and P content was 10.8 % wt. corresponding to the La/P atomic ratio of 1.1.

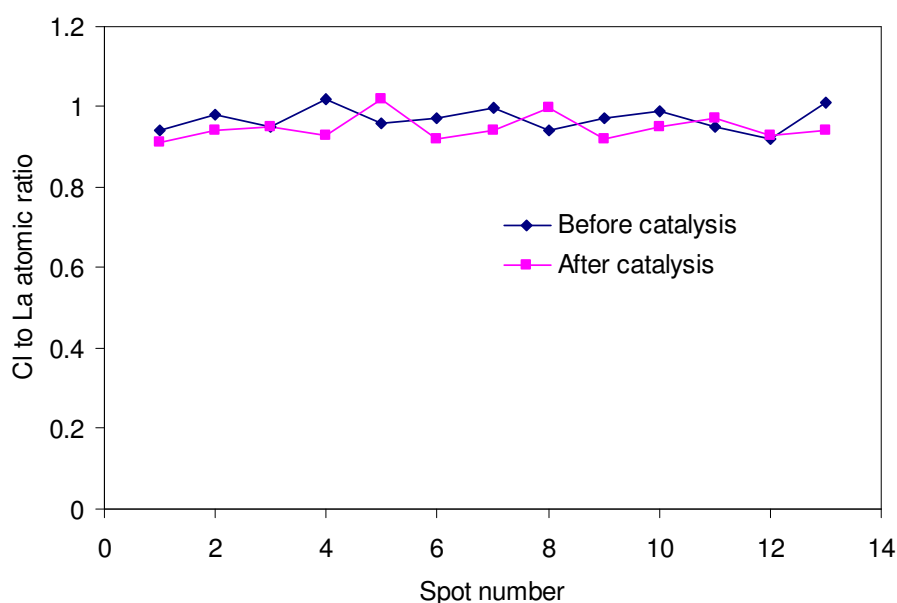


Figure S1. Data of EDS analysis of the initial LaOCl before and after IPA decomposition test.

Table S2 XPS-derived atomic contents of elements in selected samples before and after catalytic test.

Sample	Atomic per cent or atomic ratio						La/CL	La/P
	La	O	C	P	Cl			
Initial LaOCl	23,5	34,8	19,6	0,0	22,3		1,051	
Initial LaOCl after IPA	24,6	34,8	17,5	0,0	23,0		1,066	
HCl-etched LAOCl	24,0	36,9	17,7	0,0	21,4		1,120	
HCl-etched LaOCl after IPA	24,4	36,1	17,4	0,0	22,1		1,110	
Phosphate treated LaOCl	15,7	46,3	23,3	14,5	0,4		39,17	1,08
Phosphate treated after IPA	15,5	44,6	25,2	14,4	0,5		30,96	1,07

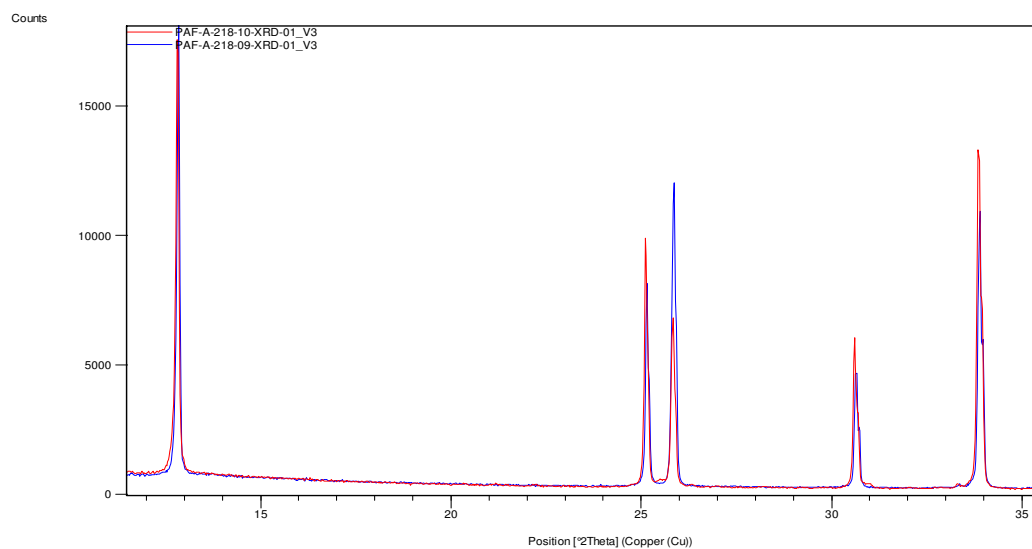


Figure S2. XRD patterns of the HCl-etched (red) and KOH-treated (blue) LaOCl solids after catalytic test. All lines correspond to LaOCl phase.

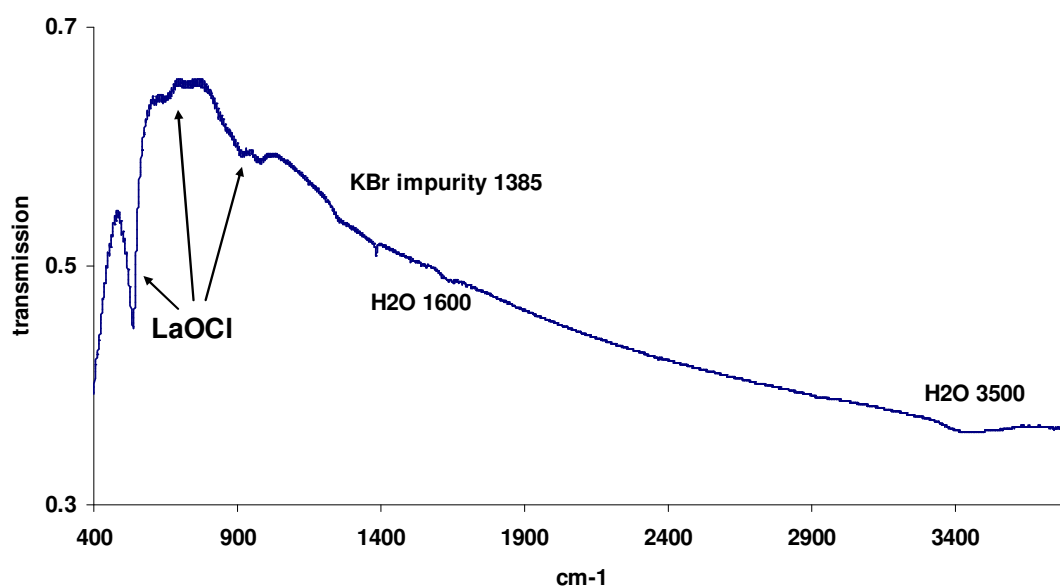


Fig. S3 IR spectrum of the HCl-etched LaOCl after catalytic test

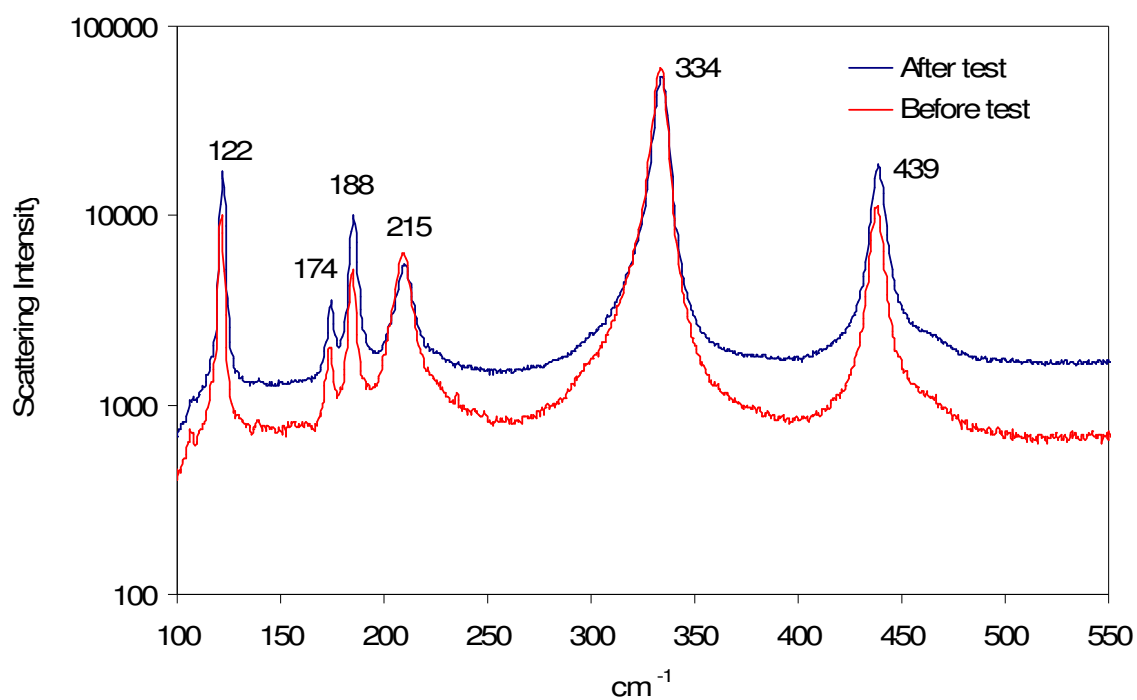


Fig. S4 Raman spectra of HCL-etched LaOCl before and after catalytic test.

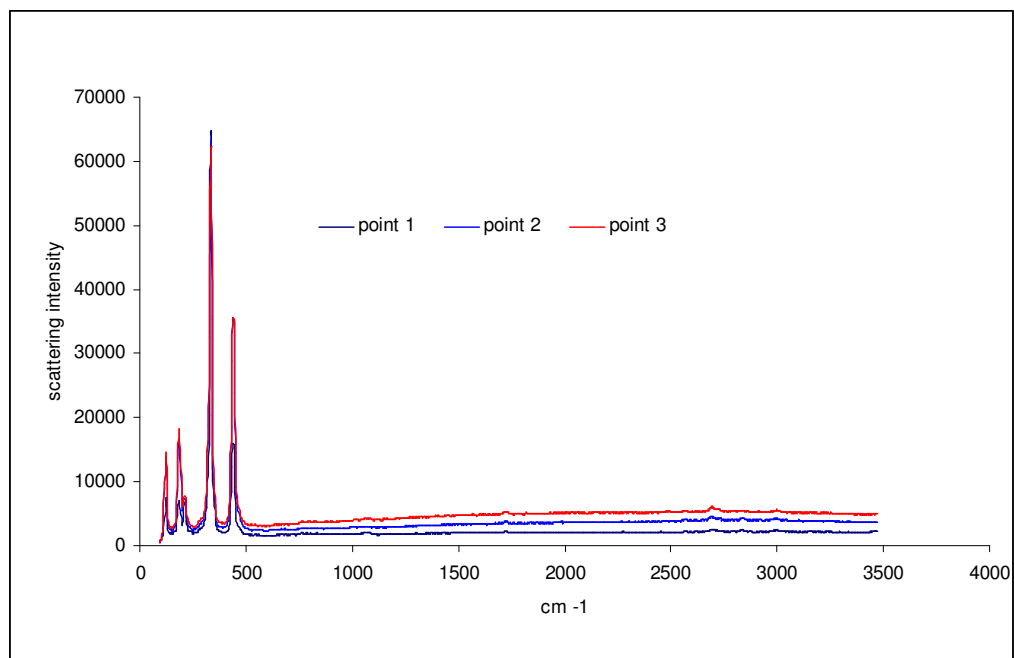


Fig S5. Raman spectra measured at three random points, showing homogeneity of the initial sheet-like sample LaOCl, measured after IPA test.

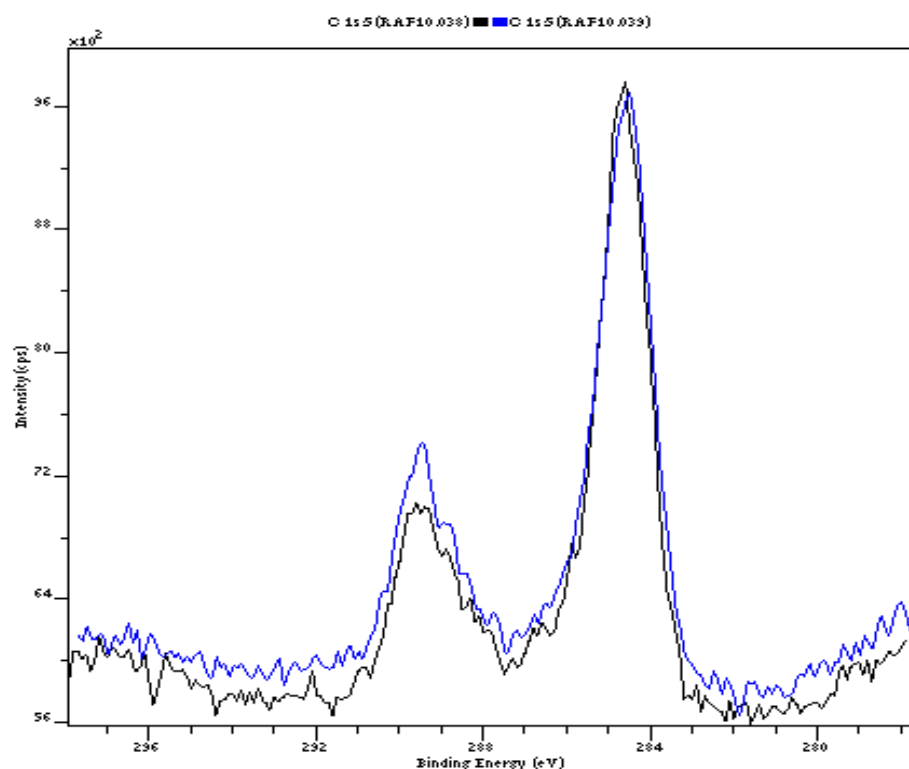


Fig S6. XPS spectra of carbon for the HCl-etched LaOCl before (black) and after (blue) IPA decomposition test.

Table S3 Thermodynamic parameters for the reaction
 $\text{LaOCl} + 2\text{H}_2\text{O} = \text{La}(\text{OH})_3 + \text{HCl(a)}$

T	deltaH	deltaS	deltaG	K	Log(K)
C	kJ	J/K	kJ		
0	13.636	-50.318	27.380	5.803E-006	-5.236
20	2.304	-91.877	29.238	6.163E-006	-5.210
60	2.960	-89.775	32.868	7.017E-006	-5.154
100	3.748	-87.551	36.418	7.975E-006	-5.098

Table S4 Thermodynamic parameters for the reaction
 $\text{LaOCl} + 2\text{HCl(a)} = \text{La(+3a)} + 3\text{Cl(-a)} + \text{H}_2\text{O}$

T°C	deltaH	deltaS	deltaG	K	Log(K)
	kJ	J/K	kJ		
0.	-109.066	-28.518	-101.276	2.338E+019	19.369
20.	-122.085	-73.902	-100.421	7.851E+017	17.895
40.	-136.756	-122.351	-98.442	2.642E+016	16.422
60.	-150.389	-164.559	-95.566	9.663E+014	14.985
80.0	-163.964	-204.125	-91.878	3.898E+013	13.591
100.	-178.191	-243.300	-87.404	1.722E+012	12.236

Table S5 Thermodynamic parameters for the reaction
 $\text{La(OH)}_3 + 3\text{HCl(a)} = \text{La(+3a)} + 3\text{Cl(-a)} + 3\text{H}_2\text{O}$

T°C	deltaH kJ	deltaS J/K	deltaG kJ	K	Log(K)
0.	-122.702	21.799	-128.656	4.028E+024	24.605
20.	-124.390	17.975	-129.659	1.274E+023	23.105
40.	-139.410	-31.629	-129.505	4.016E+021	21.604
60.	-153.349	-74.784	-128.434	1.377E+020	20.139
80.	-167.270	-115.356	-126.531	5.211E+018	18.717
100.	-181.939	-155.749	-123.821	2.159E+017	17.334

Table S6 Thermodynamic parameters for the reaction
 $\text{LaOCl} + \text{OH(-a)} + \text{H}_2\text{O} = \text{La(OH)}_3 + \text{Cl(-a)}$

T°C	deltaH kJ	deltaS J/K	deltaG kJ	K	Log(K)
0.	-38.709	53.767	-53.395	1.628E+010	10.212
20.	-44.473	32.654	-54.045	4.273E+009	9.631
40.	-44.809	31.549	-54.689	1.328E+009	9.123
60.	-45.325	29.954	-55.304	4.698E+008	8.672
80.	-45.905	28.264	-55.886	1.849E+008	8.267
100.	-46.480	26.678	-56.435	7.955E+007	7.901