catalysts

MDPI

Supporting Information

Role of $SrCO_3$ on Photocatalytic Performance of $SrTiO_3$-$SrCO_3$ Composites

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Kinetics of diclofenac degradation

Table S1. The first-order reaction rate constants (k) in association with the determination coefficients (R^2).

Sample	k (min^{-1})	R^2
cSTO	0.0542	0.9931
STO_5_SCO	0.2092	0.994
STO_15_SCO	0.1503	0.9885
STO_21_SCO	0.1894	0.9948
STO_24_SCO	0.09	0.9949

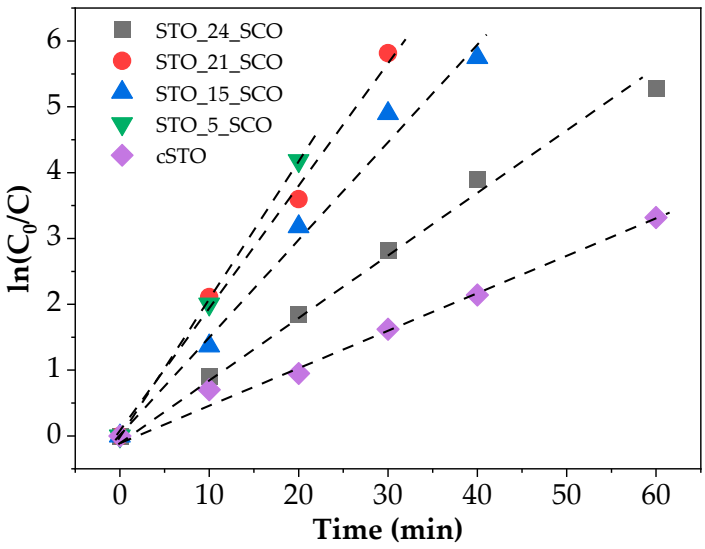

Figure S1. Plot of $\ln(C_0/C)$ *vs.* time.

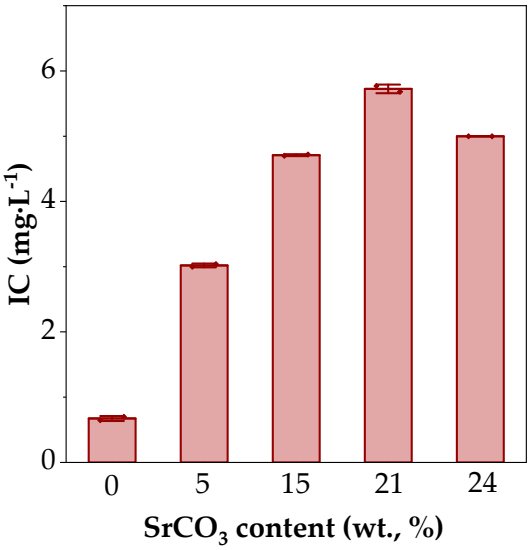

Figure S2. The inorganic carbon content of the final reaction mixture (IC_{final}) *vs* $SrCO_3$ content of the fresh catalyst.

Stability issues

The STO_15_SCO after the photocatalytic test was collected, dried, and analyzed *via* XRD. The Rietveld analysis was performed based on the recorded XRD (Figure S3). The as determined $SrCO_3$ content of the spent catalyst was 12 wt. %, which confirmed our assumption related to the dissolution of $SrCO_3$ after the photocatalytic experiment.

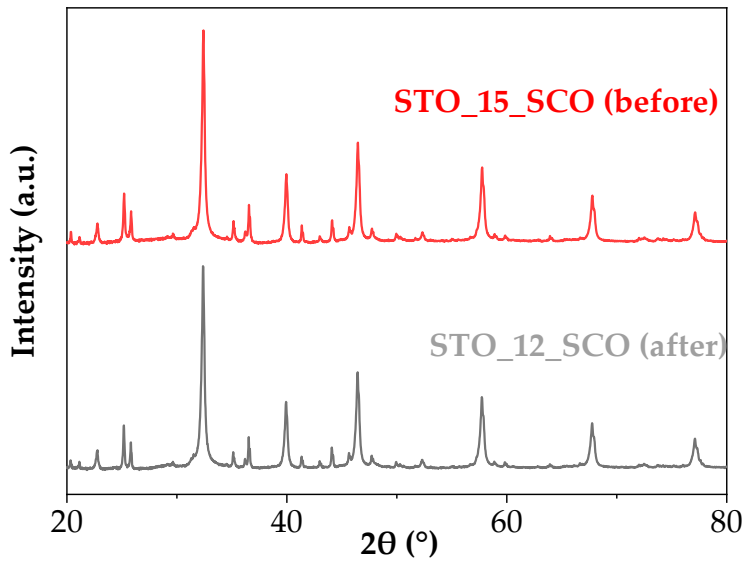

Figure S3. The XRD pattern of the catalyst before and after the 4 h photodegradation test.

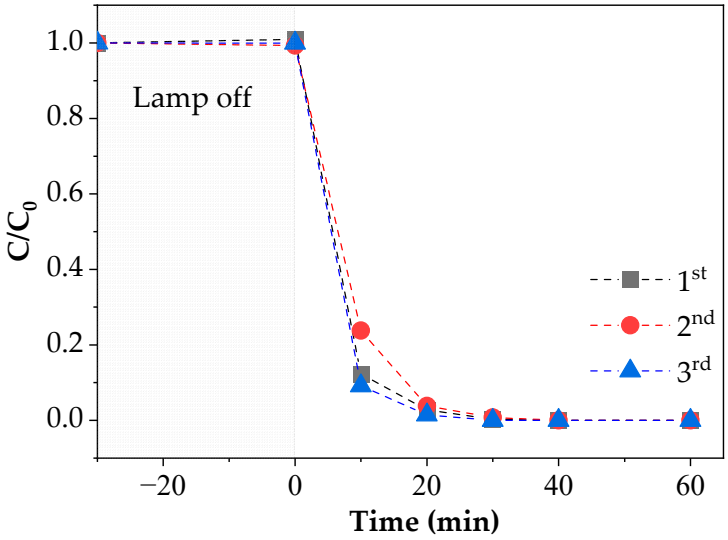

Figure S4. The transformation of DCFNa over 3 cycles using STO_21_SCO.

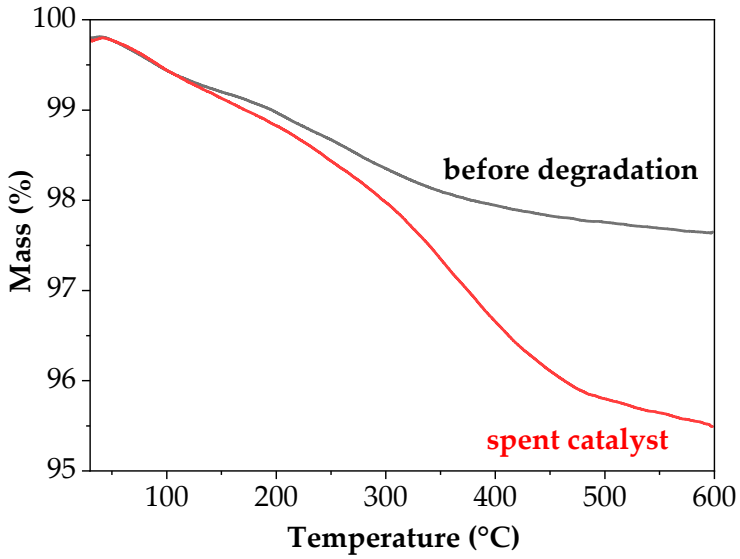

Figure S5. TGA thermogram for the best performing catalyst (STO_21_SCO) before and after degradation of DCFNa.

To find out the reason behind the deactivation of the catalyst, TGA measurements were carried out (Figure S5). The TGA thermogram of the unused STO_21_SCO showed a 2.4% total weight loss (in the range of 25–600 °C). This value in the case of STO_21_SCO after DCFNa degradation had been doubled (4.5%) in the same temperature rate. The mass loss of the catalysts below 300°C was assigned mainly to water (both for the unused and spent catalysts). Moreover, the mass loss in the 300–450 °C region was considerable in the case of the spent catalyst, and it was associated with the desorption or "destruction" of the degradation intermediates and products. Although different approaches were applied for catalyst regeneration, namely thermal treatment (300 °C, 2 h) and washing (with H_2O), the applied strategies were not effective enough. According to these results, thermal treatment at higher temperatures could be one option for the desorption of intermediates, however the modification of certain morphological and structural properties (i.e., particle size) should be considered at elevated temperatures.