SUPPLEMENTARY INFORMATION

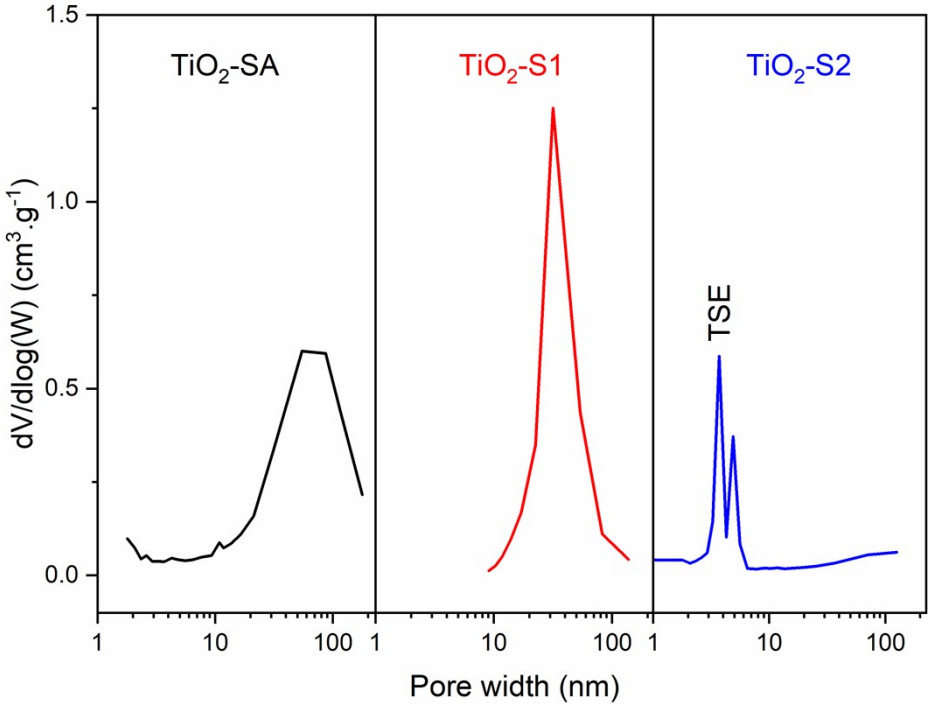

Figure S1. Pore size distribution (PSD) curves of bulk TiO_2 samples (obtained from BJH method, desorption branch).

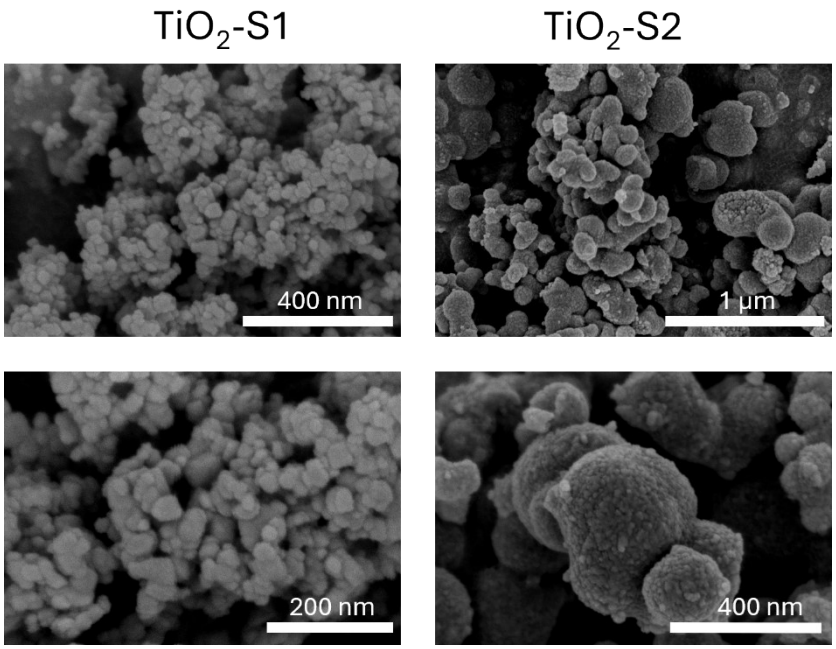

Figure S2. SEM images of bulk TiO_2 samples with different magnifications: left, TiO_2-S1 and right, TiO_2-S2.

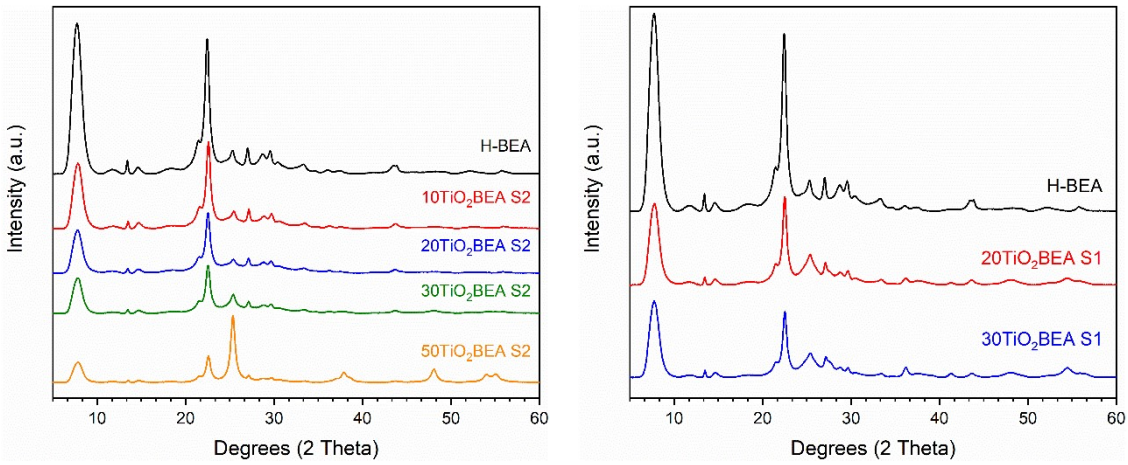

Figure S3. PXRD patterns of (left) S2 series and (right) Si series composites.

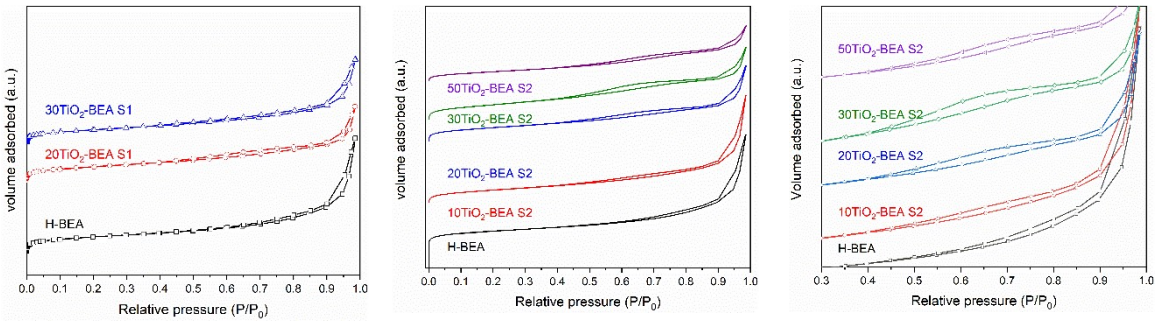

Figure S4. N_2 isotherms at 77 K for the different composite materials: (left) raw HBEA support and TiO_2-BEA S1 series; (middle, right) TiO_2-BEA S2 series.

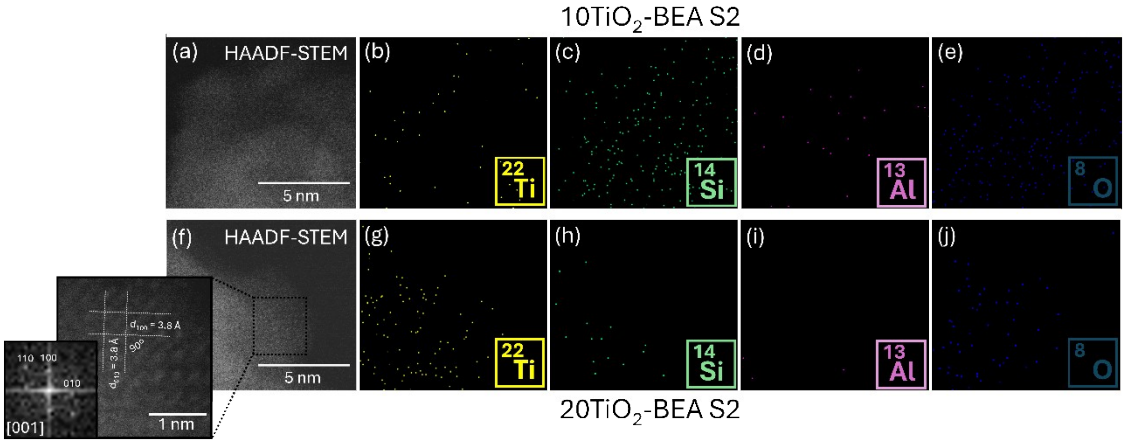

Figure S5. (a) HAADF-STEM image of the $10TiO_2$-BEA S2 sample together with the EDS maps of (b) Ti, (c) Si, (d) Al, and (e) O. (f) HAADF-STEM image of the $20TiO_2$-BEA S2 sample, where the insets show a magnified image of the TiO_2 nanocrystal with its FFT pattern. The EDS maps of (g) Ti, (h) Si, (i) Al, and (j) O are also presented.

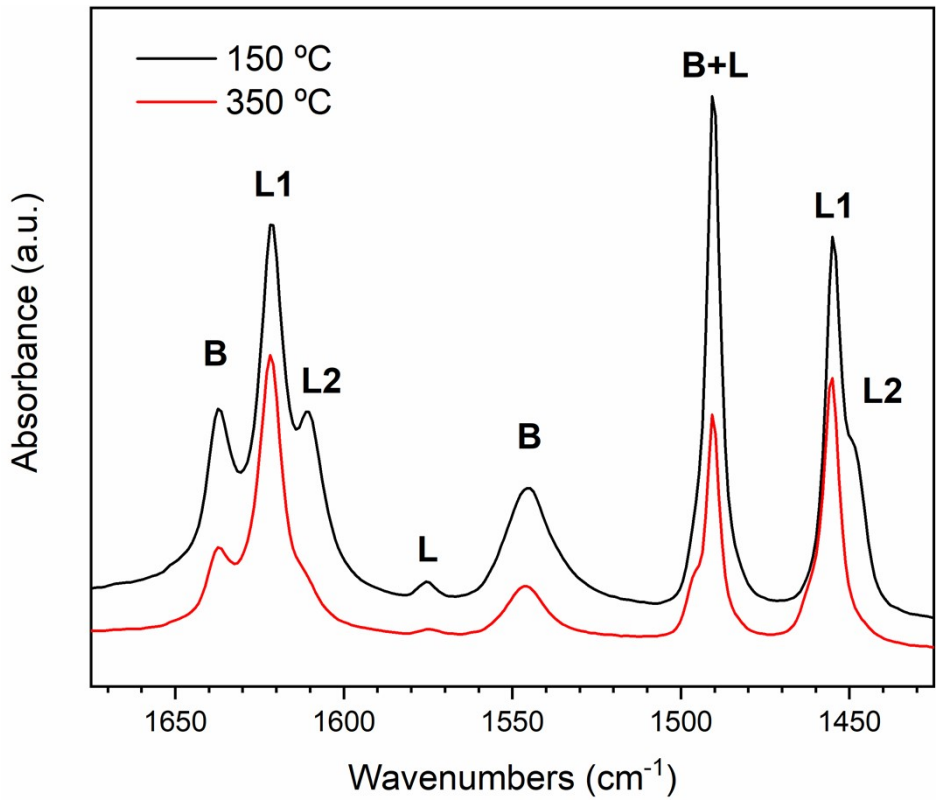

Figure S6. Infrared difference spectra of sample 20TiO_2-BEA S2 showing the bands of pyridine at 150 and 350 ºC (B: band of pyridine adsorbed onto Brönsted acid sites; L1 and L2: band of pyridine adsorbed onto Lewis acid sites, respectively Al and Ti species).

Table S1. Band gap values of all the composites determined by the Tauc plot indirect method.

Sample	Band gap (eV)
TiO_2 SA	3.33
TiO_2 bulk S1	3.18
20 TiO_2-BEA S1	3.42
30TiO_2-BEA S1	3.29
TiO_2 bulk S2	3.24
10TiO_2-BEA S2	3.49
20TiO_2-BEA S2	3.43
30TiO_2-BEA S2	3.37
50TiO_2-BEA S2	3.29

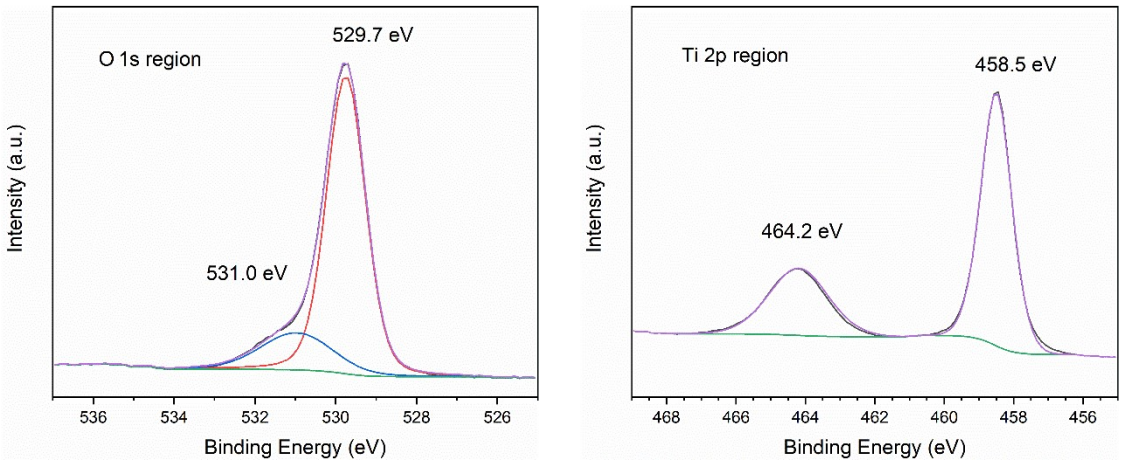

Figure S7. XPS spectra of bulk TiO_2 reference (TiO_2-SA): (left) O1s region; (right) Ti2p region.

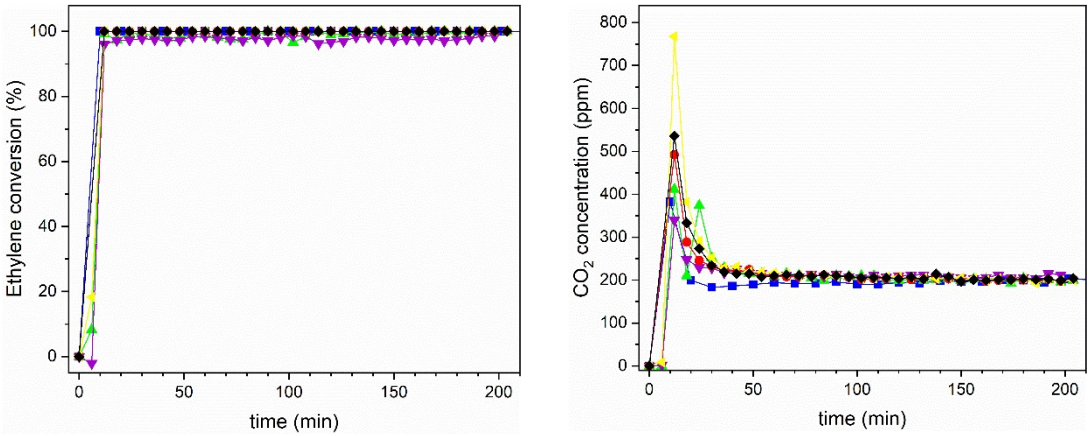

Figure S8. Ethylene photooxidation experiments under UV-Vis light for 10TiO_2-BEA S2 (♦), 20TiO_2-BEA S2 (■), 30TiO_2-BEA S2 (●), 50TiO_2-BEA S2 (◄); 20TiO_2-BEA S1 (▲) and 30TiO_2-BEA S1 (▼): (left) ethylene conversion; (right) CO_2 concentration (experimental conditions C_2H_4 100 ppm, 25 $cm^3.min^{-1}$, 0.45g).

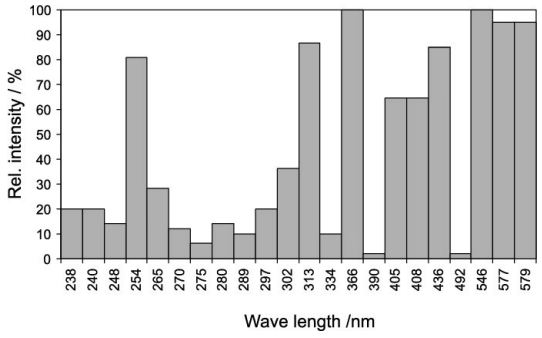

Figure S9 – Mercury lamp: relative intensity as a function of wavelength.