

Article

Exploring the photothermo-catalytic performance of Brookite $\text{TiO}_2\text{-CeO}_2$ composites

Supporting Information

S1. XPS spectra

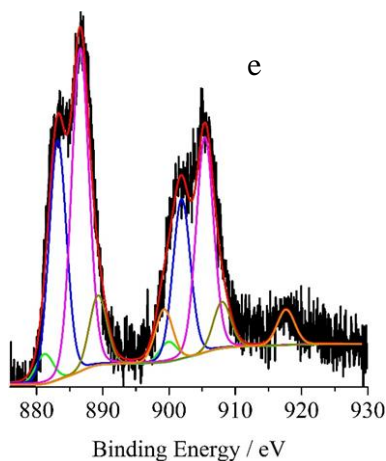
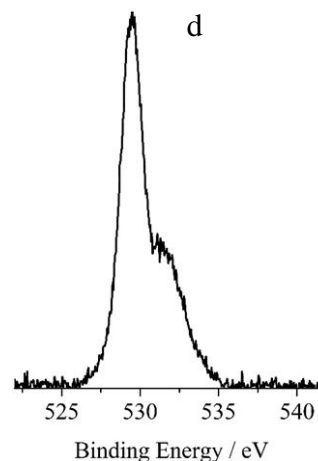
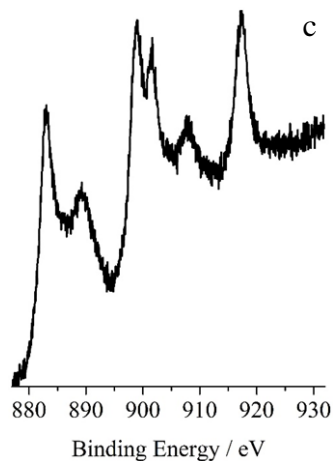
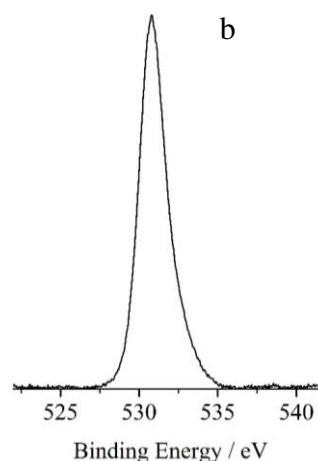
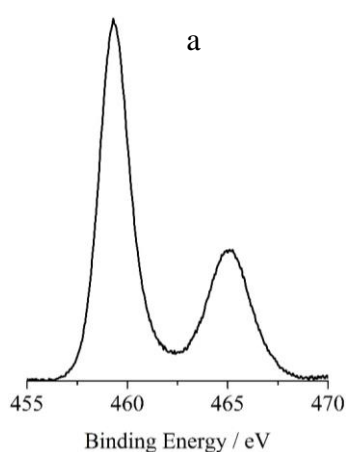


Figure S1. (a) Al K α excited XPS of the brookite TiO₂ sample, measured in the Ti 2p binding energy region; (b) Al K α excited XPS of the brookite TiO₂ blank, measured in the O 1s binding energy region; (c) Al K α excited XPS of the CeO₂ sample, measured in the Ce 3d binding energy region; (d) Al K α excited XPS of the CeO₂ sample, measured in the O 1s binding energy region; (e) Fitting of the Al K α excited XPS of the Ti/Ce5 sample, measured in the Ce 3d binding energy region. The 3d_{5/2} - 3d_{3/2} spin-orbit doublets at 883.2 - 901.8 (blue line), 889.4 - 908.0 (dark yellow line) and 899.0 - 917.5 (orange line) eV refer to the 3d⁹4f²(O 2p⁴), 3d⁹4f¹(O 2p⁵) and 3d⁹4f⁰(O 2p⁶) Ce⁴⁺ states, respectively. The 3d_{5/2} - 3d_{3/2} spin-orbit doublets at 881.2 - 899.8 (green line) and 886.5 - 905.1 (magenta line) eV refer to the 3d⁹4f¹(O 2p⁶) and 3d⁹4f²(O 2p⁵) Ce³⁺ states, respectively. The red line superimposed to the experimental black profile refers to the sum of all the Gaussian components. Structure due to satellite radiation has been subtracted from all the spectra.

S2: Thermocatalytic oxidation of 2-propanol

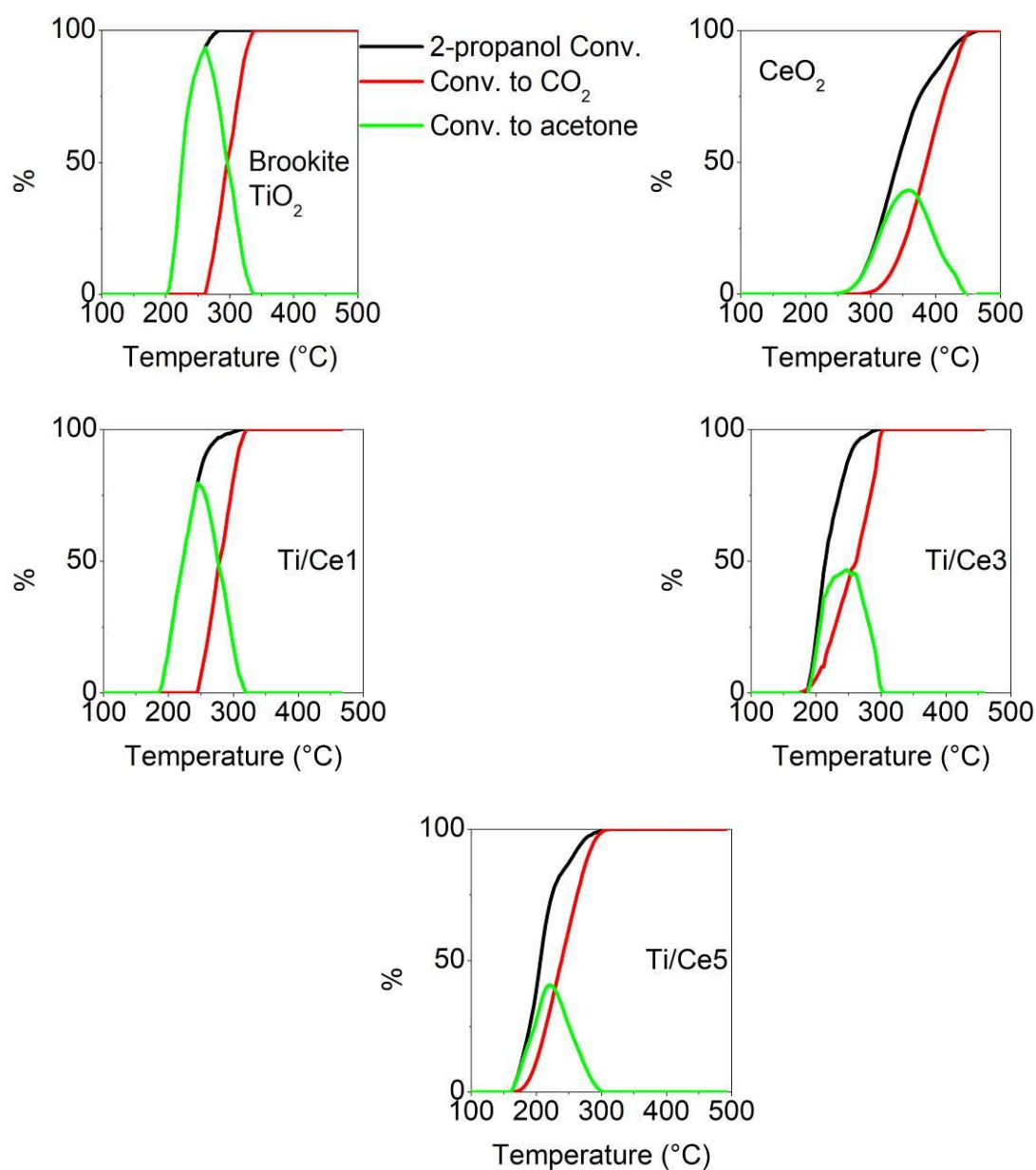


Figure S2. 2-propanol thermocatalytic oxidation over the investigated samples.

S3: Photothermo-catalytic oxidation of 2-propanol

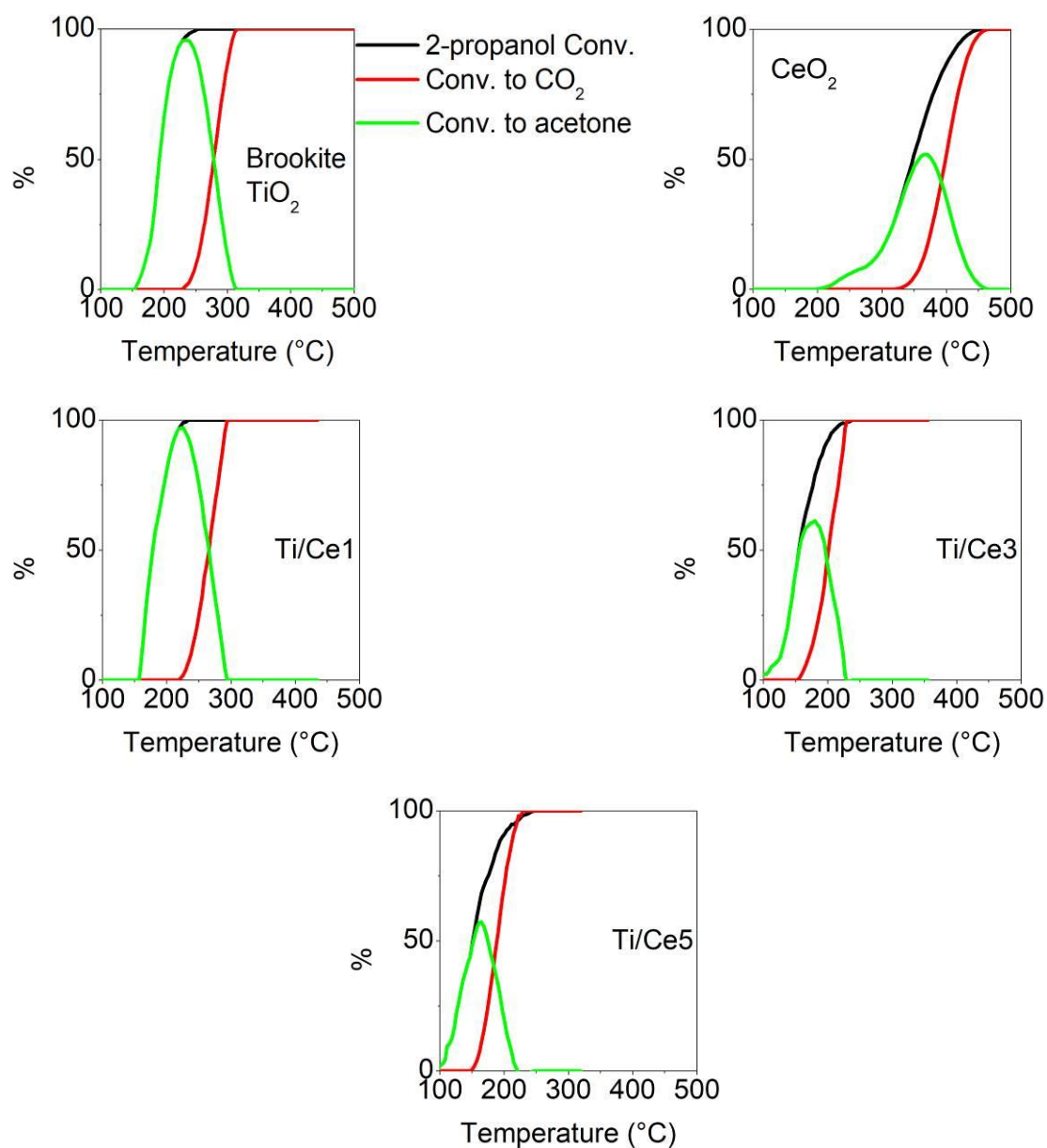


Figure S3. 2-propanol photothermo-catalytic oxidation over the investigated samples.

S4: Thermocatalytic oxidation of ethanol

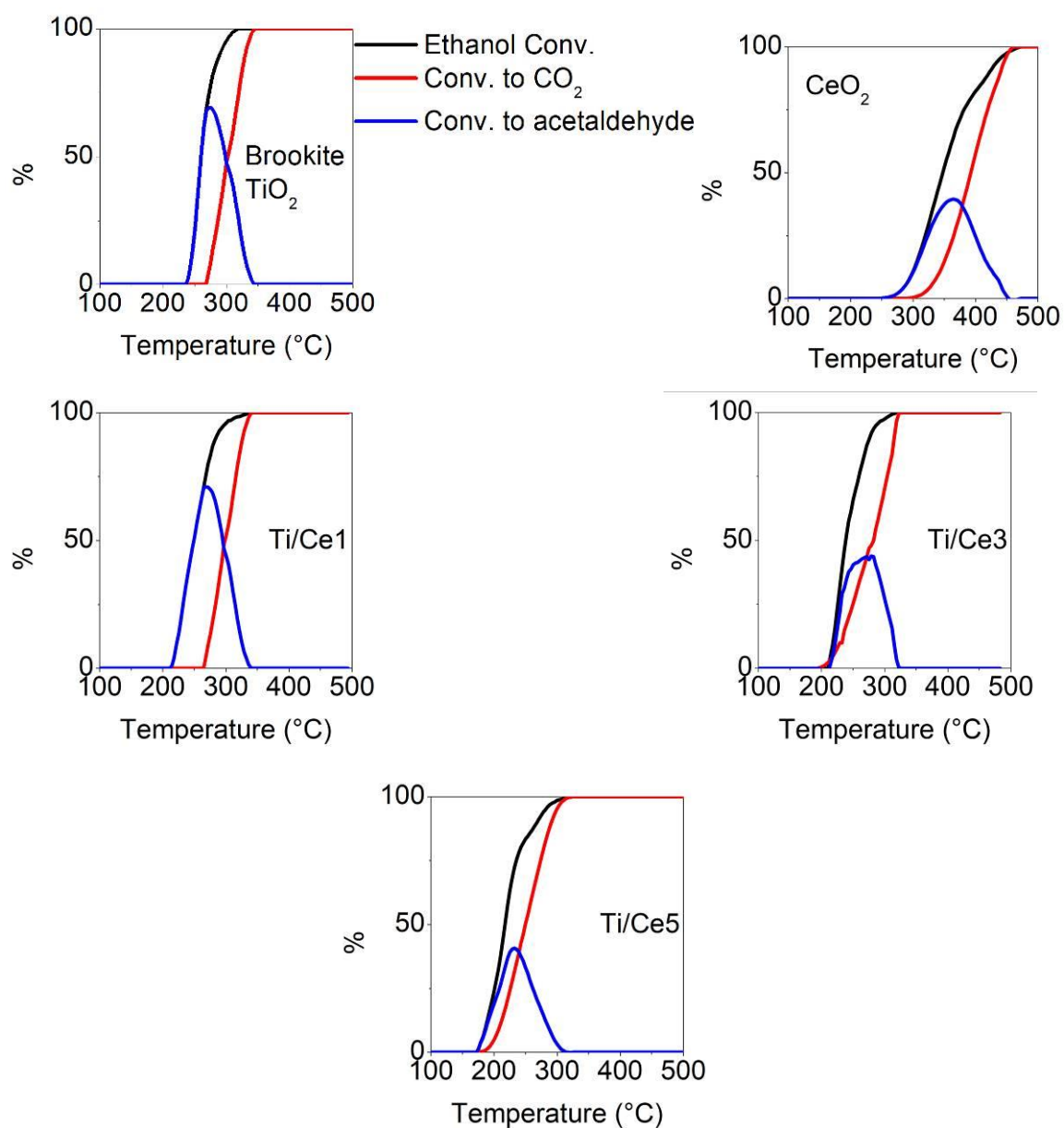


Figure S4 Ethanol thermocatalytic oxidation over the investigated samples.

S5: Photothermo-catalytic oxidation of ethanol

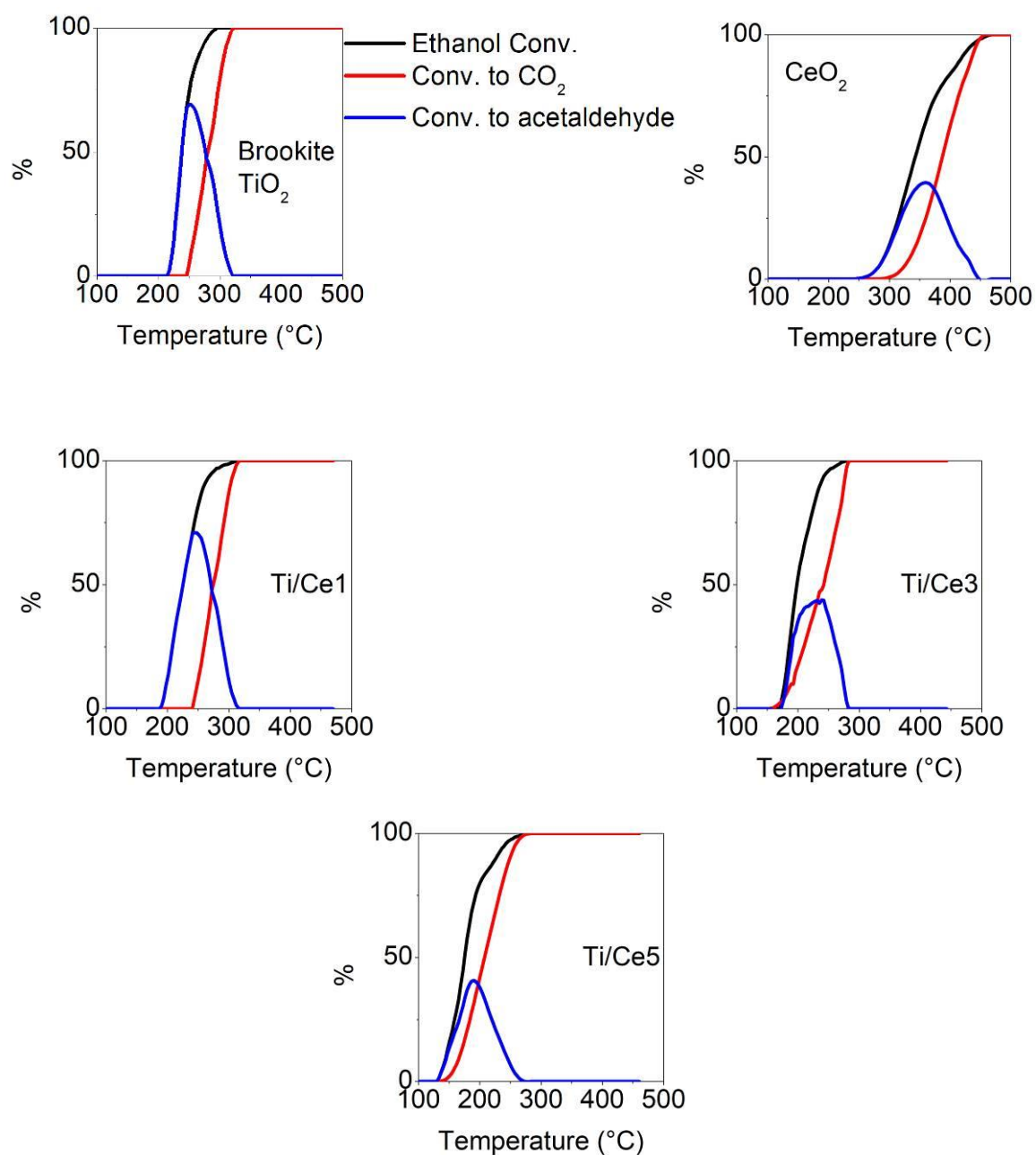
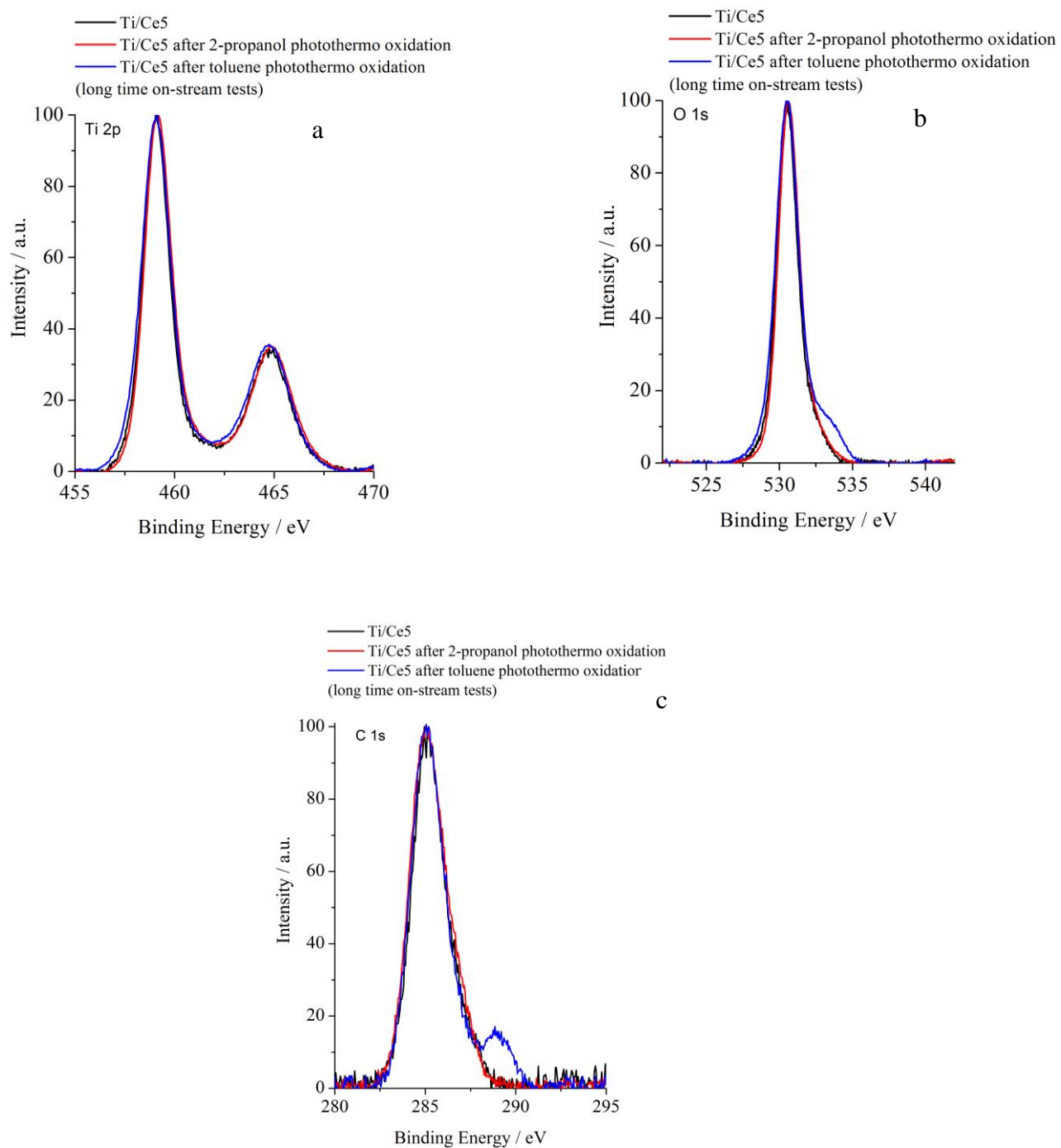


Figure S5 Ethanol photothermo-catalytic oxidation over the investigated samples.

S6: XPS comparison of Ti/Ce5 composite before and after the photothermo-catalytic oxidation of 2-propanol and toluene.



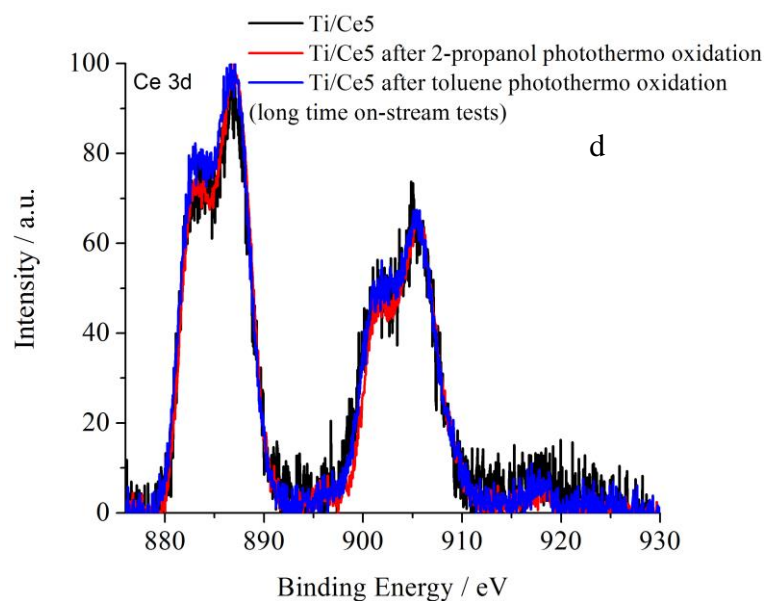


Figure S6. XPS spectra of the Ti/Ce5 sample before and after the photothermal catalytic oxidation of 2-propanol and toluene: (a) Ti 2p binding energy region; (b) O 1s binding energy region; (c) C 1s binding energy region; (d) Ce 3d binding energy region.