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# A highly active Ca/Cu/YCeO2-TiO2 catalyst for the transient reduction of NO with CO and naphthalene in the presence of oxygen

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Table S1 shows the ANOVA analysis for the statistical model representing the experimental response which was the temperature when reaching 80% of CO conversion.

Table S1. ANOVA for the response surface of the reduced quadratic model

| Source | Sum of Squares | df | Mean Square | F Value | p-value Prob > F | |
|---|---|---|---|---|---|---|
| **Model** | 1913.999 | 7 | 273.4 | 15.9 | 3.4E-05 | significant |
| **A-Ce** | 177.4411 | 1 | 177.4 | 10.3 | 7.5E-03 | |
| **B-Cu** | 570.5555 | 1 | 570.6 | 33.1 | 9.1E-05 | |
| **C-Ca** | 610.6028 | 1 | 610.6 | 35.5 | 6.7E-05 | |
| **AB** | 264.5 | 1 | 264.5 | 15.4 | 2.0E-03 | |
| **AC** | 18 | 1 | 18 | 1.0 | 3.3E-01 | |
| **BC** | 144.5 | 1 | 144.5 | 8.4 | 1.3E-02 | |
| **$C^2$** | 128.3991 | 1 | 128.4 | 7.5 | 1.8E-02 | |
| **Residual** | 206.5515 | 12 | 17.2 | | | |
| **Lack of Fit** | 157.7182 | 7 | 22.5 | 2.3 | 1.9E-01 | not significant |
| **Pure Error** | 48.83333 | 5 | 9.8 | | | |
| **Cor Total** | 2120.55 | 19 | | | | |
| **Std. Dev.** | 4.14881 | | R-Squared | 0.90 | | |
| **Mean** | 169.85 | | Adj R-Squared | 0.85 | | |
| **C.V. %** | 2.442632 | | Pred R-Squared | 0.71 | | |
| **PRESS** | 619.5568 | | Adeq Precision | 17.11 | | |

The model F-value of 15.9 implies the model is significant and there is only a 0.01% chance that an F-value this large could occur due to noise. The values of Prob > F less than 0.05 indicate model terms are significant, which in this case were A, B, C, AB, BC, $C^2$. The lack of fit F-value of 2.31 implies the lack of fit is not significant relative to the pure error. There is a 18.72% chance that a lack of fit F-value this large could occur due to noise. Regarding the predicted $R^2$ of 0.7078, it is in reasonable agreement with the adjusted $R^2$ of 0.85 (i.e. the difference is less than 0.2). The precision measures the signal to noise ratio, which is desirable to be higher than 4. In this case the precision was 17.11 corresponding to an adequate signal to noise ratio.

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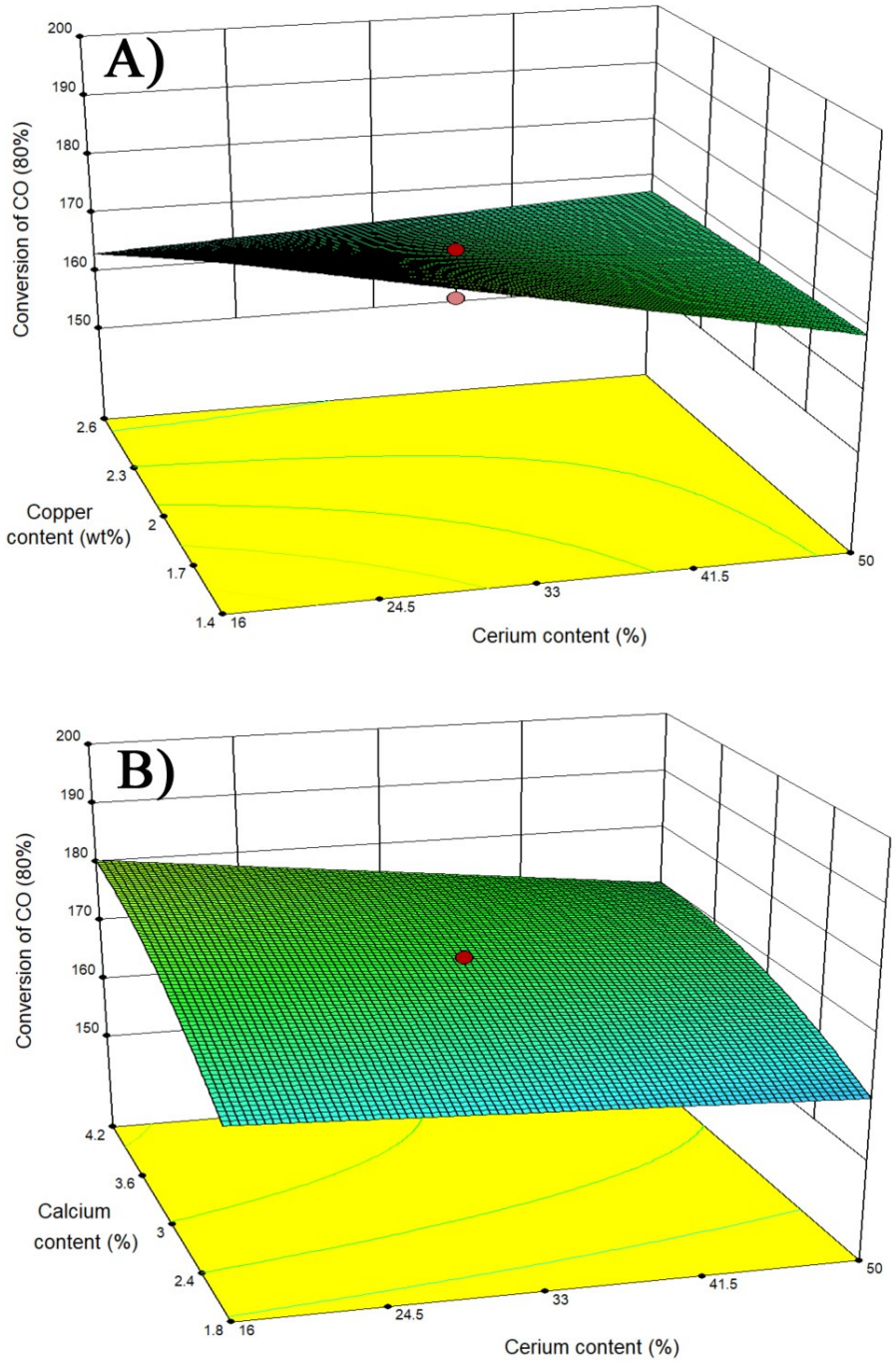


Figure S1. Surface plots of (A) calcium versus ceria content (B) ceria versus copper content.

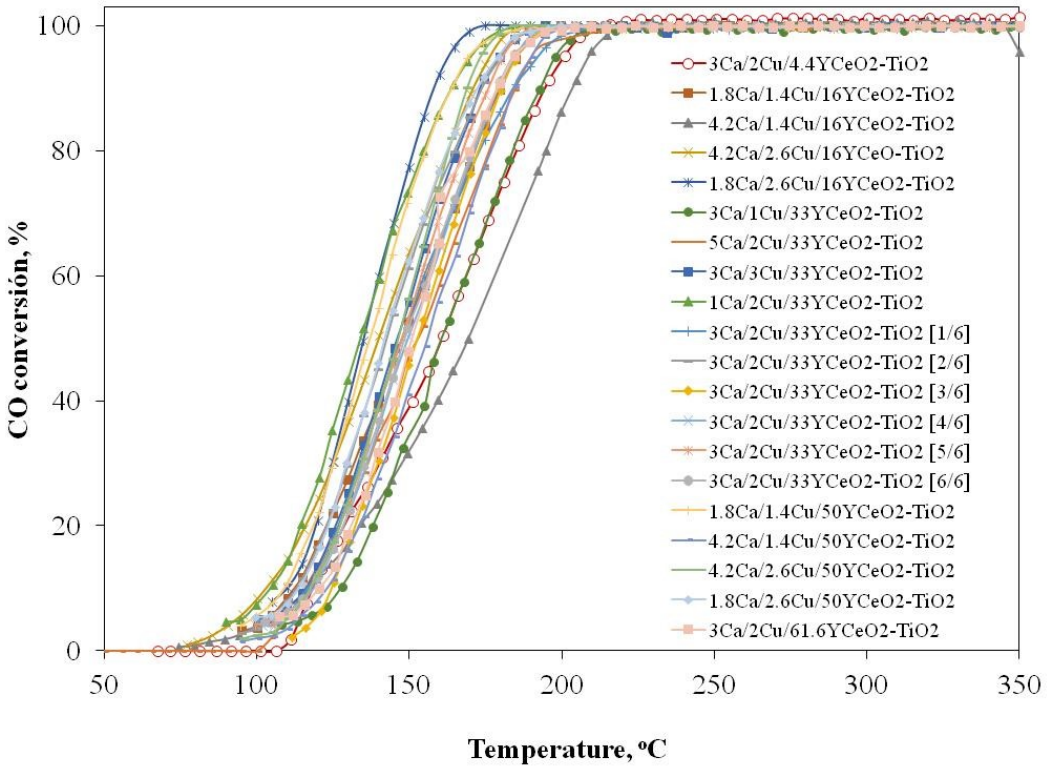


Figure S2. CO conversion during the transient reduction of NO with CO and naphthalene in the presence of oxygen in the series of the catalysts required from the central composite design. The notation for each αCa/βCu/γ$YCeO_2$-$TiO_2$ catalyst represents the weight percent loading of calcium (α), copper (β), and ceria (γ).

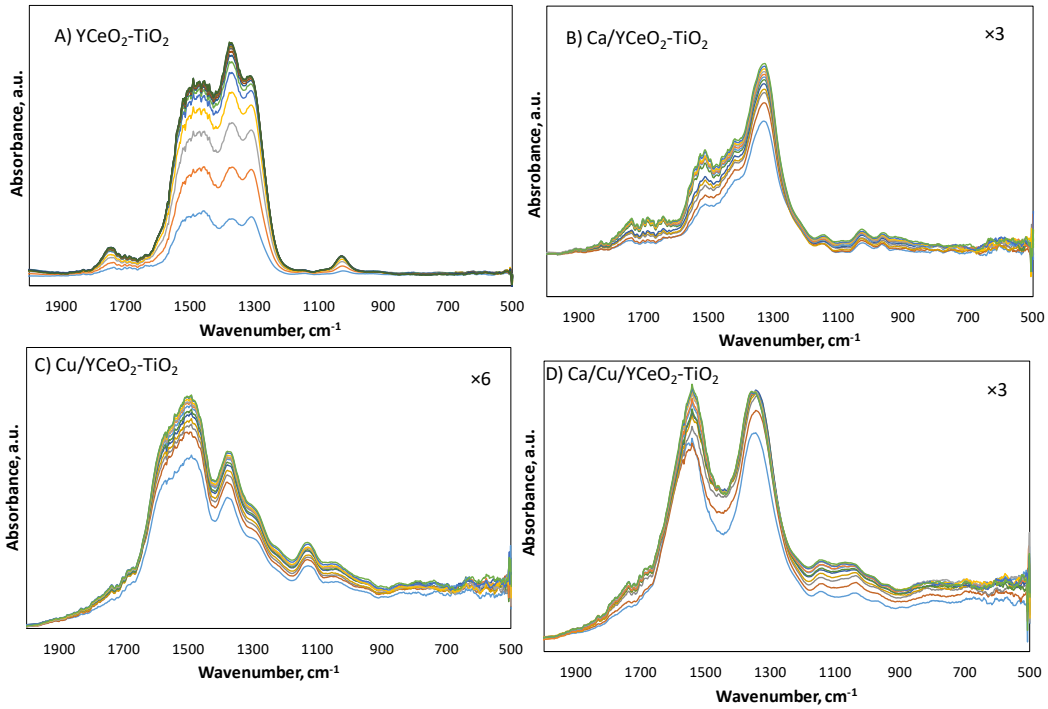


Figure S3. DRIFTS analysis of the reduction of NO with CO in oxygen on the (A) $YCeO_2$-$TiO_2$, (B) Ca/$YCeO_2$-$TiO_2$, (C) Cu/$YCeO_2$-$TiO_2$, and (B) Ca/Cu/$YCeO_2$-$TiO_2$ catalysts at 200 °C for 1 hour.

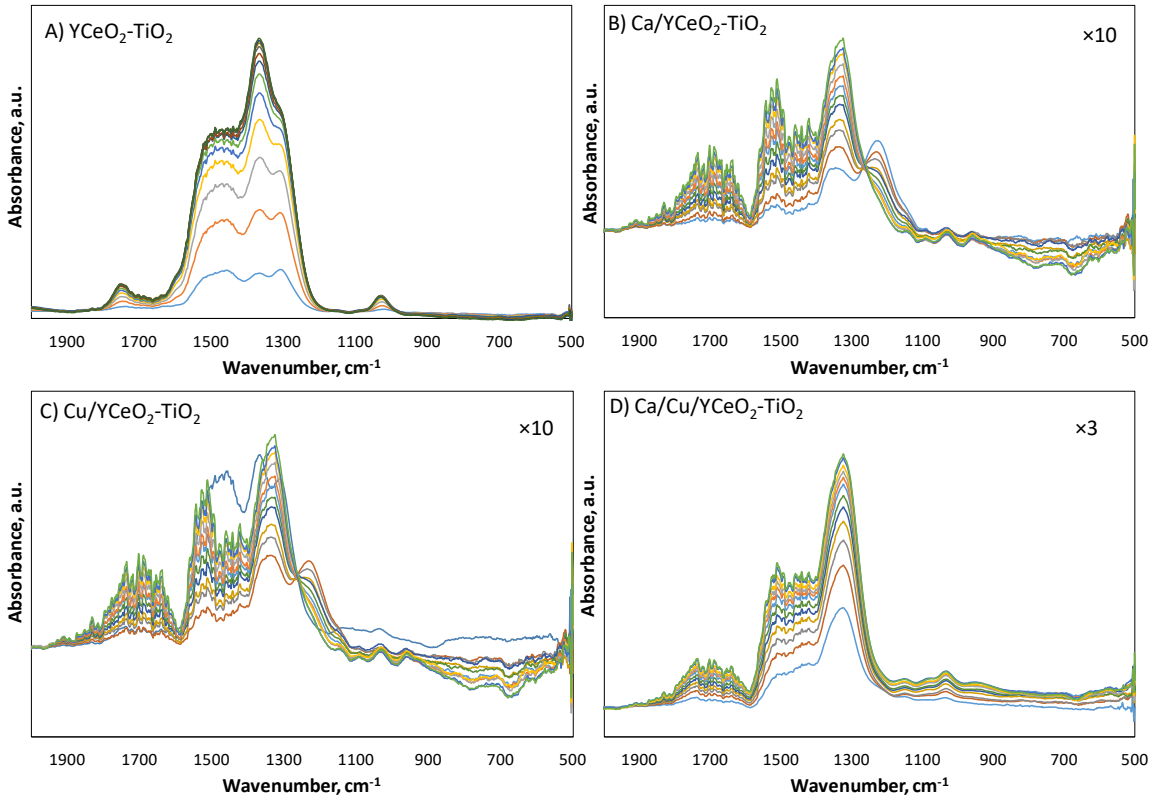


Figure S4. DRIFTS analysis of the oxidation of NO in oxygen on the (A) $YCeO_2$-$TiO_2$, (B) Ca/$YCeO_2$-$TiO_2$, (C) Cu/$YCeO_2$-$TiO_2$, and (B) Ca/Cu/$YCeO_2$-$TiO_2$ catalysts at 200 °C for 1 hour.

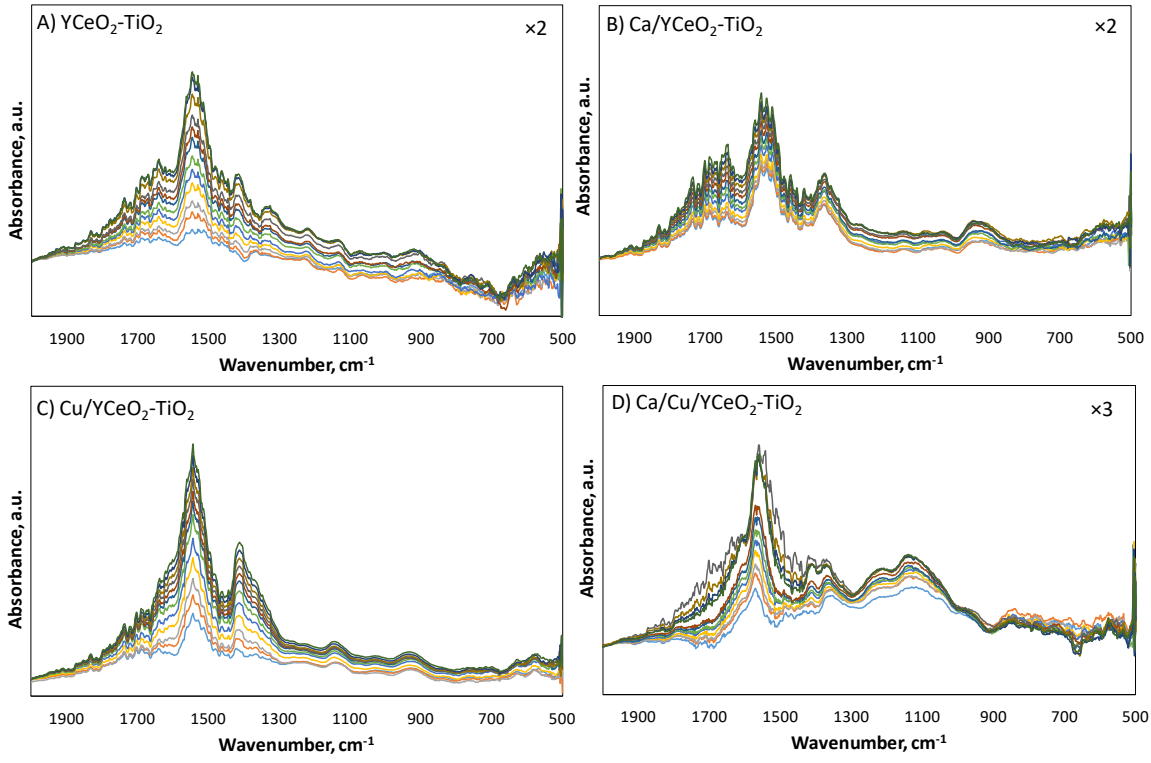


Figure S5. DRIFTS analysis of the oxidation of naphthalene in oxygen on the (A) $YCeO_2$-$TiO_2$, (B) Ca/$YCeO_2$-$TiO_2$, (C) Cu/$YCeO_2$-$TiO_2$, and (B) Ca/Cu/$YCeO_2$-$TiO_2$ catalysts at 200 °C for 1 hour.

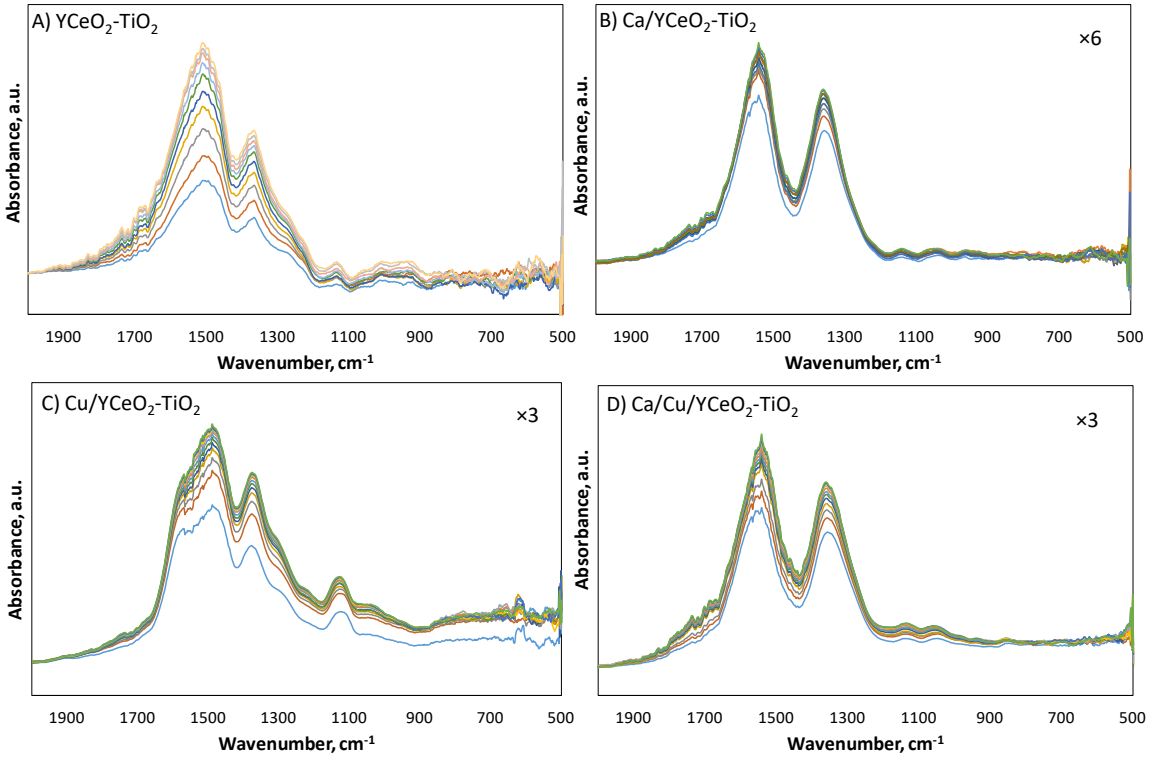


Figure S6. DRIFTS analysis of the oxidation of CO in oxygen on the (A) $YCeO_2$-$TiO_2$, (B) Ca/$YCeO_2$-$TiO_2$, (C) Cu/$YCeO_2$-$TiO_2$, and (B) Ca/Cu/$YCeO_2$-$TiO_2$ catalysts at 200 $^oC$ for 1 hour.