

## TRABALHO PUBLICADO EM PERIÓDICO

### **Synthesis of dimethyl carbonate from CO<sub>2</sub> and methanol over CeO<sub>2</sub> : Role of copper as dopant and the use of methyl trichloroacetate as dehydrating agent**

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Abstract: The effect of copper as dopant on ceria (CeO<sub>2</sub>) was investigated in the direct synthesis of dimethyl carbonate (DMC) from CO<sub>2</sub> and methanol. Ceria with different copper loadings (0.02 and 0.5 wt%) was synthesized using the dry impregnation method and characterized by H<sub>2</sub>-TPR, XRD, EPR, UV–VIS/DRS, acid-base properties and N<sub>2</sub> physisorption. CeO<sub>2</sub> with 0.02 wt% of Cu showed the highest catalytic activity and selectivity to DMC, mostly due to its basic sites, associated with the presence of oxygen vacancies. Higher Cu concentration (0.5 wt%) promotes dehydrogenation, favoring the formation of methyl formate as the main product. Pure CeO<sub>2</sub> also produced dimethoxymethane as by-product. To circumvent the thermodynamic limitations of the reaction, methyl trichloroacetate was tested as dehydrating agent, showing superior performance than 2-cyanopyridine, due to its higher reactivity toward hydrolysis.