Biodiesel synthesis over green catalyst: The effect of thermal treatment of CaO/Zeolite precursor on catalytic activity

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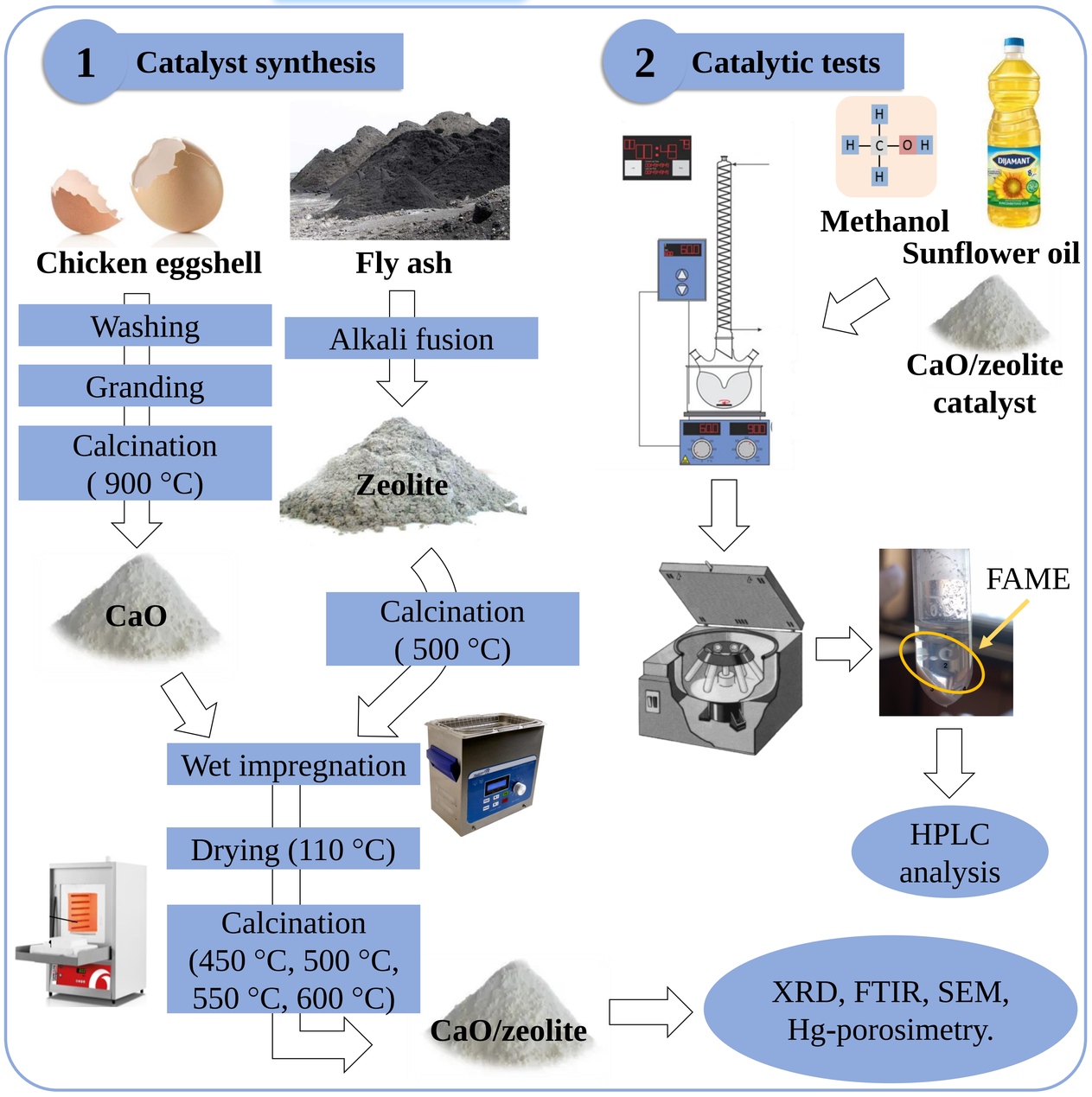
Introduction

- The **green CaO/zeolite catalyst** was synthesized from the **waste materials**.
- CaO derived from **chicken eggshell** was loaded onto **fly ash-based zeolite catalyst carrier** by the wet impregnation method using an alcohol solution.
- The catalytic tests were performed in a stirred batch reactor at the following reaction conditions: **60 °C** - reaction temperature, **12:1** - methanol/oil molar ratio, and **4 wt%** - catalyst concentration.
- The precursor and catalyst samples were characterized by XRD, FTIR, SEM, and Hg-porosimetry techniques.
- The FAME content was determined by HPLC.
- The aim of present study was was to examine the effect of **thermal treatment** of CaO/zeolite precursor on **catalytic activity** in methanolysis reaction.

Methodology



References

- S. Pavlović, P. Banković, D. Marinković, M. Stanković, Advanced ceramics and Application VIII-New, **2019**, 43.
- M. Zdujić, I. Lukić, Ž. Kesić, et al., Adv Powder Technol, **2019**, 30, 1141-1150.

Introduction · Methodology · Results and Discussion

SEM

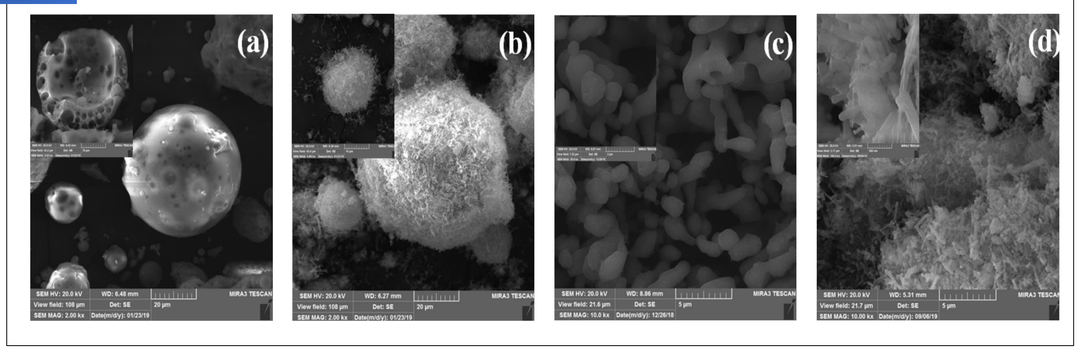


Figure 1. SEM micrograph of (a) fly ash, (b) zeolite, (c) CaO, (d) CaO/Zeolite-550 catalyst.

XRPD

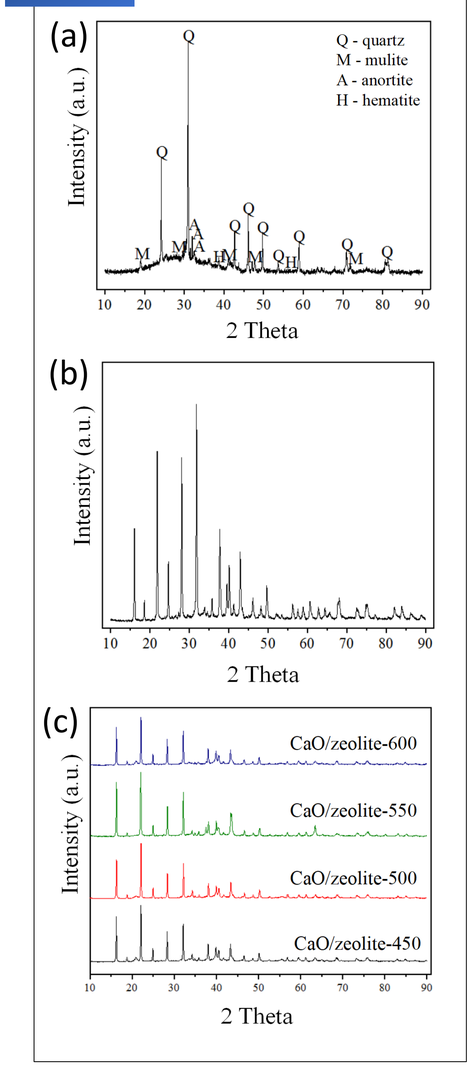


Figure 2. Difractograph of (a) fly ash, (b) zeolite, (c) catalysts.

FTIR

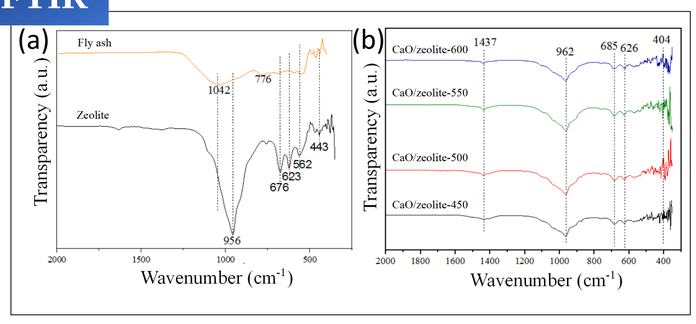


Figure 3. IR spectra of (a) fly ash and zeolite, (b) catalysts.

HPLC

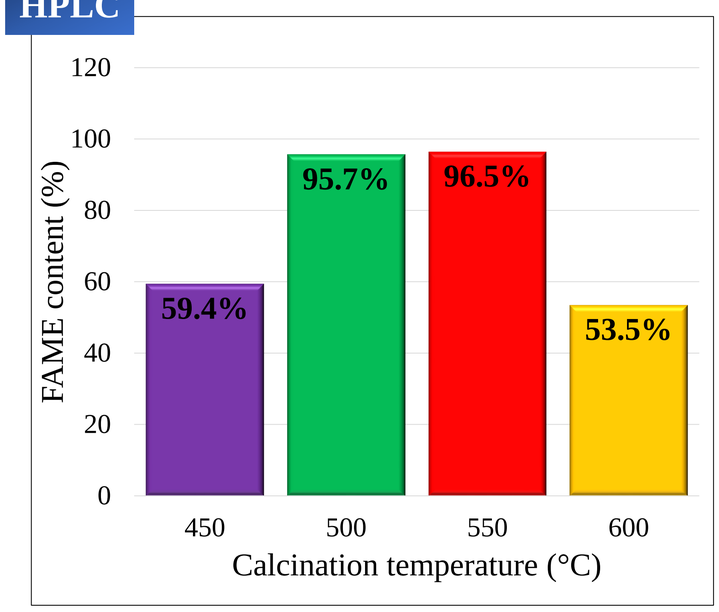


Figure 4. The FAME content after 2 h with catalyst calcined at different temperatures.

Introduction · Methodology · Results and Discussion · Conclusion

- ✓ The alumosilicate form of **fly ash** changes during alkaline fusion to the **chancritic-sodalite type of zeolite**.
- ✓ The structure of the zeolite remains unchanged during impregnation, but some change occurs at temperatures above 550 °C, which indicates its thermoinstability.
- ✓ **550 °C** is the optimal temperature for **thermal activation** of the **green CaO/zeolite catalyst**.

Acknowledgments

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