**activity, stability and limit cycles bEhavior of co oxidation over Ir / La1-xSrxMnO3** **-perovskite catalysts.**

c. drosou1,\*, A. STRAtakis2, T.V. FOUNTOULI1, V. nikolaoy1, c. matsouka3,4, l. nalbandian4, V. zaspalis3,4, n.d. charisiou5, m.a. goula5,\*, i.v. yentekakis1,\*

1 Laboratory of Physical Chemistry & Chemical Processes, School of Environmental Engineering, Technical University of Crete, GR-73100 Chania, Greece

2 School of Mineral Resources Engineering, Technical University of Crete, GR-73100 Chania, Greece

3 Dept. of Chemical Engineering, Aristotle University of Thessaloniki, GR-54124 Thessaloniki, Greece

4 Chemical Processes and Energy Resources Institute, CERTH, GR-57001 Thermi, Thessaloniki, Greece

5 Dept. of Chemical Engineering, University of Western Macedonia, GR-50100, Greece

\*corresponding authors: *I.V. Yentekakis (*[*yyentek@isc.tuc.gr*](mailto:yyentek@isc.tuc.gr)*); C. Drosou (*[*EDrodou@isc.tuc.gr*](mailto:EDrodou@isc.tuc.gr)*); M.A. Goula (*[*mgoula@uowm.gr*](mailto:mgoula@uowm.gr)*).*

Keywords: CO oxidation, LSM perovskites, iridium, limit cycle behavior, rate hysteresis.

The CO oxidation is one of the most extensively investigated reactions in heterogeneous catalysis, gaining renewed increasing attention, not only because for its demand in automotive and many stationary processes but also due to its very complicate behavior including steady state multiplicity, limit cycles and oscillations as well as chaotic behavior. On the other hand, Ir is a relatively cheap noble metal compared to the other ones of the group and its consideration in emissions control catalysis (i.e., Three-way catalytic converters of cars) and in other high temperature applications in CO processing catalysis (e.g., Fischer-Tropsch synthesis reactions, water gas shift reaction e.t.c) can be renewed after the lately invented ways for Ir particles stabilization at stressing high temperature oxidative conditions. Here we report on the CO oxidation behavior over Ir/La1-xSrxMnO3 catalysts in a wide range of temperatures (50-400oC) and oxygen excess conditions (1.0% v/v CO, 5.0% v/v O2 balanced with He, FT = 160 mL/min, mcat = 20 mg, wGHSV=480 000mL/gcath). The La1-xSrxMnO3 (x=0, 0.3, 0.5, and 0.7) perovskites were prepared by a co-precipitation method while the addition of Ir (2% w/w Ir loading) on the perovskite powders was employed by the wet impregnation method. Several pretreatment protocols were imposed in order to investigate in detail the stability of the catalysts and the limit cycle reaction behavior observed with counterclockwise hysteresis versus temperature. Moreover, the textural and structural properties of Ir/La1-xSrxMnO3 catalysts were evaluated by various techniques, such as X-ray diffraction (XRD), BET-BJH N2 adsorption-desorption method, temperature-programmed reduction by H2 (H2-TPR), and isothermal H2 chemisorption (H2-Chem) in order to better understand the correlation between the structure or other physicochemical properties of the syntesized Ir/La1-xSrxMnO3 catalysts with their activity and stability.

**Acknowledgements:** Financial support by the *GREEK-CHINESE BILATERAL RESEARCH AND INNOVATION COOPERATION, 2018-2021 programme (Project No: T7ΔΚI-00356) is gratefully acknowledged.*

**