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Hydrogen-to-synfuels via transition metal oxide (TMO) catalysts

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Abstract

Growing concerns about environmental pollution and energy shortages have prompted new seeks in the field of chemistry and sustainable processes, for meeting human development goals while at the same time protecting the environment and preserving natural resources. On this address, European Community nations have adopted new Policies for a sustainable development, aiming to replace the fossil source and modify the traditional refinery by introducing renewable biofeedstock. Furthermore, the utilization of CO2 as "raw material" for the synthesis of value-added products (oils, solvents, chemicals, etc.) appears one of the most promising strategic route for a "greener economy". To meet these goals, it become imperative the design and development of novel advanced catalytic processes and materials, timely designed for the manufacturing of efficient, safe and environmentally benign fuels starting from various feedstock, ranging from bio-oil to carbon oxides. Many transition metals are differently active catalytic materials in the hydrogenation reactions, at temperatures between 180-360°C and pressure up to 100 bar. The chemical properties of the diverse transition elements can deeply affect the selectivity path of the hydrogenation reactions, modifying the products distribution and the hydrocarbon chain length of products. Therefore, a series of different catalytic formulations based have been proved and compared in the synthesis of green-fuels via hydrotreating processes. This work is aimed to ascertaining the feasibility of hydrogenation processes under industrial conditions for the advanced syn-fuel production, establishing the effect of the catalytic formulation on catalytic performance.

Biography

Doctor Lorenzo Spadaro is senior researcher and qualified professor of Industrial Chemistry. He has received his education at the Universities of Messina, Reggio Calabria, Turin and Rome, obtaining Ph.D. and Sc.D. in Industrial Chemistry and Chemical Engineering. Since 2007 he has been researcher of the National Research Council of Italy (CNR) and University Lecturer of several courses in Catalysis, Advanced Materials, Fuels and Renewable Energy, GreenChemistry, Process Engineering and Chemistry. His main research activities concern the "Design of Catalysts and Industrial Processes for Energetic and Environmental Applications". He's coauthor of about 300 technical-scientific documents and owner of several international industrial patents.

Publications

1. Clean Syn-Fuels via Hydrogenation Processes: Acidity–Activity Relationship in O-Xylene Hydrotreating
2. A New Class of MnCeOx Materials for the Catalytic Gas Exhausts Emission Control: A Study of the CO Model Compound Oxidation
3. Definitive Assessment of the Level of Risk of Exhausted Catalysts: Characterization of Ni and V Contaminates at the Limit of Detection
4. Sunfuels from CO 2 exhaust emissions: Insights into the role of photoreactor configuration by the study in laboratory and industrial environment
5. On the promotional effect of Cu on Pt for hydrazine electrooxidation in alkaline medium
6. A Definitive Assessment of the CO Oxidation Pattern of a Nanocomposite MnCeOx Catalyst
7. Which Future Route in the Methanol Synthesis? Photocatalytic Reduction of CO 2 , the New Challenge in the Solar Energy Exploitation
8. Hydrogen Utilization in Green Fuel Synthesis via CO2 Conversion to Methanol over New Cu-Based Catalysts
9. Probing the Functionality of Nanostructured MnCeOx Catalysts in the Carbon Monoxide Oxidation: Part II. Reaction Mechanism and Kinetic modelling

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