

The effect of La in PdCe-zeolite catalysts for NO_x-SCR with CH₄

Ilona Tlalka^{1,2}, Ana Paula Ferreira^{2,3}, Acácio Nobre Mendes^{2,4}, Sandra Capela⁵, Carlos Henriques², Patrick Da Costa⁴, Monika Motak¹, Teresa Grzybek¹ and M. Filipa Ribeiro²

¹ AGH University of Science and Technology, Faculty of Energy and Fuels, Al. A. Mickiewicza 30, 30-059 Cracow, Poland.

² CEBQ, Institute for Biotechnology and Bioengineering, Instituto Superior Técnico, Universidade de Lisboa. Av. Rovisco Pais, 1049-001 Lisboa, Portugal.

³ Instituto Superior de Ciências da Saúde Egas Moniz, Quinta da Granja, 2829-511 Monte de Caparica, Almada, Portugal.

⁴ Sorbonne Universités, UPMC Univ Paris 06, UMR 7190, Institut Jean le Rond d'Alembert, F-75005, Paris, France.

⁵ GDF SUEZ, Research and Innovation Department, CRIGEN, 361 avenue du Président Wilson, 93211 Saint Denis La Plaine cedex France.

t: (+351)218417872; f: (+351)218419198; filipa.ribeiro@tecnico.ulisboa.pt

The number of natural gas vehicles in the World is expected to increase in the next future. For this reason, it is important to develop an after treatment system capable of promoting the abatement of exhaust gases emissions of this type of motors. Since January 2014, Euro 6 directive became effective, imposing a reduction of 50% in NO_x emissions in heavy duty vehicles when compared with Euro 5 directive. This reduction can only be accomplished due to a significant technological improvement. A promising technology that is not yet fully developed to deal with this issue is the Selective Catalytic Reduction with hydrocarbons (HC-SCR). It is well known that zeolite based catalysts containing metals, are active for this application¹. One of the main challenges in the development of zeolite-based catalysts for NO_x-SCR with hydrocarbons is to obtain catalysts stable in the presence of water. Studies have shown that incorporation of La in the catalyst may improve the catalytic performance in the presence of water². Also, previous works have shown that BEA zeolite is potentially interesting for this application, due to the improvement of catalytic performance in the presence of water³.

The main purpose of this work is to study the influence of La introduction into zeolites, containing Pd and Ce species, in the NO_x-SCR using methane as reductant (under lean conditions). Catalytic tests were performed in a temperature range between 300-500°C. Catalysts were characterized by H₂-TPR, powder XRD and DRS UV-Vis. These techniques were used to identify different metal species and allowed the understanding of La role in what Pd and Ce species concerns.

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