Poster session **# R.11**

Direct Alkaline Anion-Exchange Membrane Fuel Cell to Converting Methane into Methanol

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Keywords
methane to methanol, methane oxidation, electrocatalysts

Impact statement
Alkaline fuel cell to convert methane in electric power and higher value-added chemicals cogeneration

Highlights
Methane in electric power and metanol on Pt/C, Pd/C and Ni/C
Alkaline Anion-Exchange Membrane Fuel Cell for energy and chemical cogeneration
In Pt/C presents power two times higher than other materials and 20¨% of conversion of methane to methanol

Abstract
Methane is the main constituent of natural gas and can be converted in energy with fuel cell application and higher value-added chemicals cogeneration. In Alkaline Anion-Exchange Membrane Fuel Cell (AAEMFC) is possible led in a way that leads to more oxidized products, therefore more electrons transferred. The investigation was realized for the methane oxidation on Pt/C, Pd/C, Ni/C as catalysts. The electrocatalysts were prepared using a sodium borohydride method with 20 wt% of metals loading on carbon. The X-ray diffraction (XRD) analysis revealed a cubic face-centred structure (CFC) for Pt/C and Pd/C catalysts, was observed Ni/NiO phases for Ni/C electrocatalyst. The Transmission Electron Microscopy (TEM) exhibited a good dispersion of nanoparticles and some agglomerations on the support, with a mean size of 6.4 nm for Pd/C, 5.7 nm for Ni/C and near to 2 nm size for Pt/C. The experiments with AAEMFC showed that all materials can carry out the reaction spontaneously. Pt/C catalyst presents energy density twice times higher than the other materials. FTIR data suggest that methane was converted into small products organic molecules such as methanol and formate in different potentials for Pt/C, Pd/C, and Ni/C.