

**Development of Pd-CeO_x and Pd-CeO_x/C Electrocatalysts for the Oxygen Reduction
Reaction in Absence and Presence of Methanol in Alkaline Media**

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ABSTRACT

In this work, we have prepared supported and unsupported Pd-CeO₂ materials supported on carbon by using the pyrolysis method, in a H₂/N₂ (5:95) atmosphere. The (NH₄)₂PdCl₆ and Ce(NO₃)₃·6H₂O precursors were reduced at 300 and 600 °C for 3 h, in order to evaluate the effect of the temperature of synthesis on the structure and electrocatalytic properties of the materials as electrocatalysts for the Oxygen Reduction Reaction (ORR) in 0.1 M KOH in the absence and presence of 0.1 M CH₃OH. The materials were structurally characterized by XRD, EDS, SEM, and electrochemically by rotating disk electrode (RDE) measurements at room temperature, using cyclic and linear sweep voltammetry (CV and LSV) techniques. The kinetic parameters such as the Tafel slope and open circuit potential were calculated from the LSV polarization curves. The crystal size of the electrocatalysts, obtained from XRD analysis, was determined to be in the 10 to 19 nm range, depending on the synthesis conditions. The Pd-CeO₂ nanostructures showed a high catalytic activity for the ORR in alkaline solution. Moreover, these materials demonstrated tolerance to the presence of methanol. These features make the Pd-CeO₂ electrocatalysts cathode candidates for Direct Alcohol Fuel Cells.