Influence of the Temperature on the Electrochemical Properties and Morphology of Composite Materials for Gas Separation

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Development of materials for the use in alkaline electrolyzers for gas separation has been directed towards surpassing the ionic conductivity, gas tightness, chemical, mechanical and thermal resistivity, life span, and cost effectiveness of the health hazardous asbestos and current state of the art Zirfon® separator.

Ionic conductivity of different gas separation membranes can be accurately determined by Electrochemical Impedance Spectroscopy with a four-electrode zero gap cell, while the use of the four-electrode non-zero gap cell coupled with a Mass Spectrometer enables the oxygen permeability assessment.

In order to gather better understanding of the separator material’s synthesis process and to foresee its applicability in separation systems other than alkaline electrolyzers (such as fuel cells and solar hydrogen generation), the interplay of the synthesis’ parameters and the electrochemical properties of the separator is studied here.

The operating temperature during synthesis was shown to have a significant influence on the ionic conductivity of developed separators. The temperature effect on the morphology of the separators was investigated using X-ray Diffraction and Scanning Electron Microscopy.
