

## Nanoelectrocatalysts for Energy and Water Treatment

Development of advanced Pd-Based electrocatalysts for high performing fuel cell system

Fuku, Xolile G; Mkhohlakali, Andile C; Maumau, Thandiwe R; Modibedi, Remegia M

### **Abstract**

The globe is in increased need of non-fossil energy sources due to existing energy limits and global pollution issues. This chapter will discuss fuel cell energy systems as a cleaner and more environmentally friendly alternative energy source. Fuel cells have gotten a lot of press in the twenty-first century because of their potential as an alternate component of energy production. The present barrier of the fuel cell is the high cost of production materials and the manufacturing process itself. The chapter will focus on core practices that can help fuel cells compete with other energy production technologies by reducing costs and improving operational performance. This will entail providing insights into recent breakthroughs in energy materials, with a focus on new approaches or methods of synthesising materials such as platinum group metal and non-platinum group metal electrocatalysts. The electrochemical kinetic processes and catalytic activity of created catalysts, as well as the power outputs of the manufactured membrane electrode assembly in the desired Fuel cell systems, such as proton exchange membrane fuel cell (PEMFC) and Anion exchange membrane fuel cells (AEMFC), will be discussed in further detail in this chapter. Between the two systems, AEMFC is more advantageous over PEMFC because of the tolerance of non-platinum group metal catalysts thus becoming a preferred future system over PEMFC. Hence, AEMFC will be used as a preferred fuel cell system for our application.