

APPENDIX C

The laboratory synthesized PVA based alkaline membrane chemically crosslinked with 2.5 wt % glutaraldehyde was used for MEA fabrication and detail single cell study with various loading, fuel and electrolyte concentration was performed. The chemical crosslinked PVA membrane was doped with optimum 6 M KOH solution for imparting ionic conductivity. The anode and cathode electrocatalysts were Pt-Ru/C and Pt/C_{HSA}, respectively. The fixed cathode electrocatalyst loading of 1 mg/cm² was taken for all the experiments. The cell temperature was maintained at 30 °C. The cathode oxidant used was humidified oxygen. The experimental results (current density vs. cell voltage and current density vs. power density characteristics) are given below:

C.1 Effect of methanol concentration at fixed Pt-Ru/C anode loading of 0.5 mg/cm²

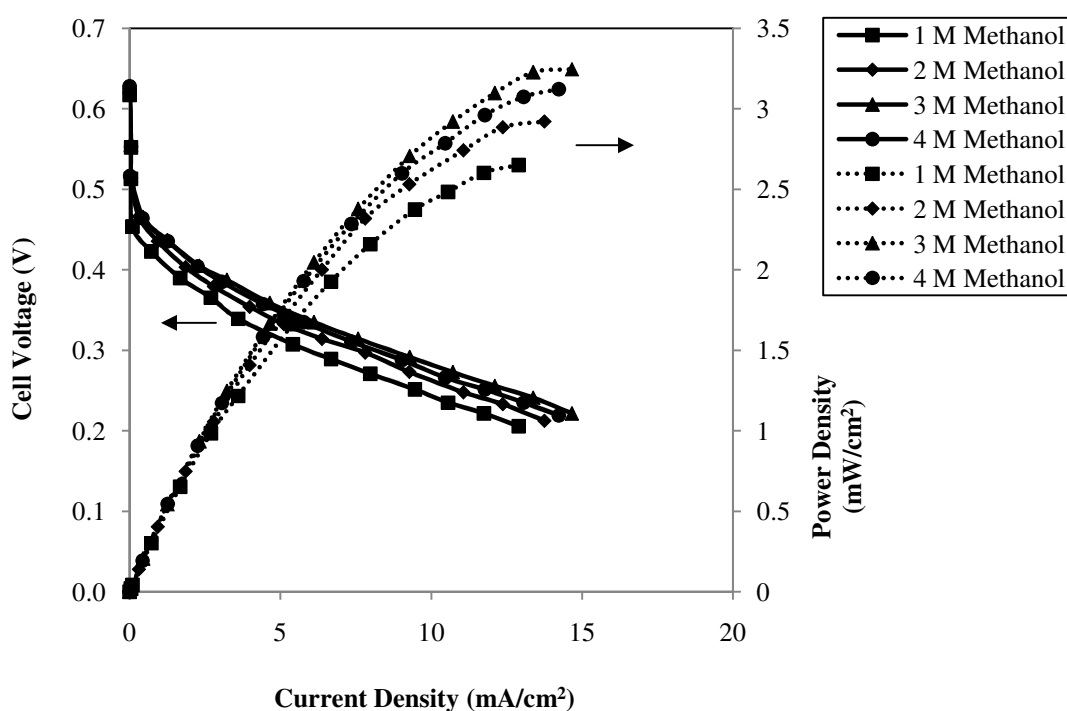


Figure C.1 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 2 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

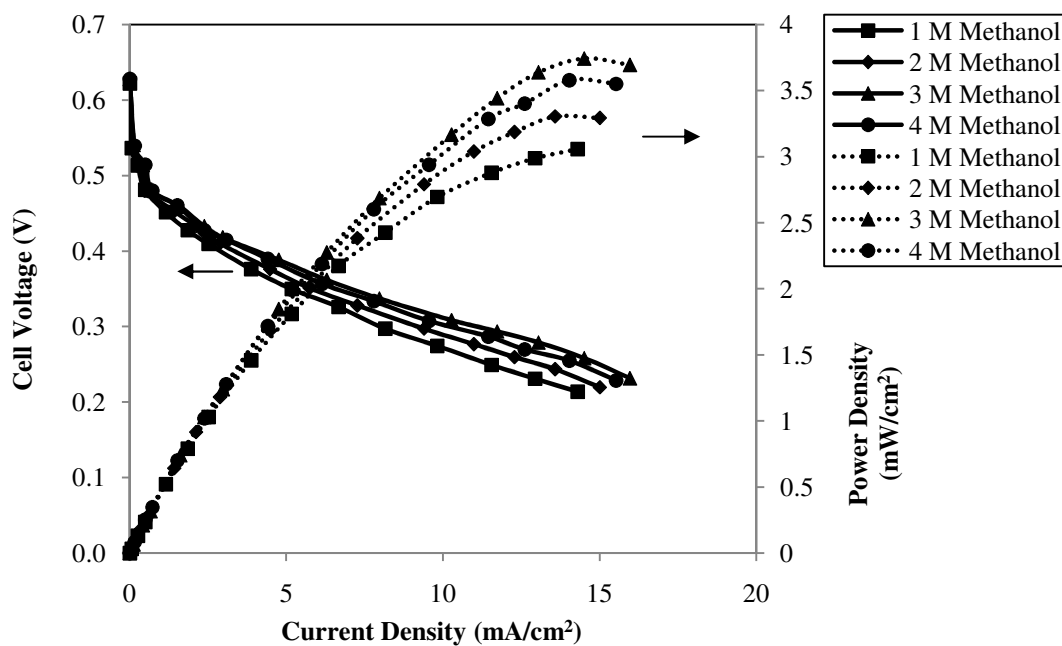


Figure C.2 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 4 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

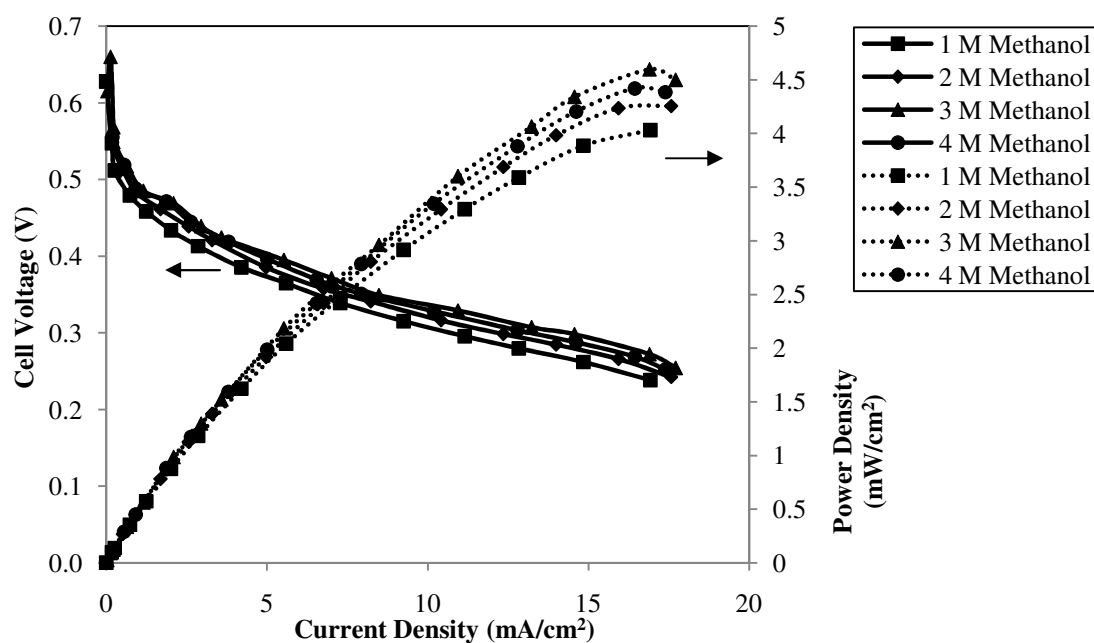


Figure C.3 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 6 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

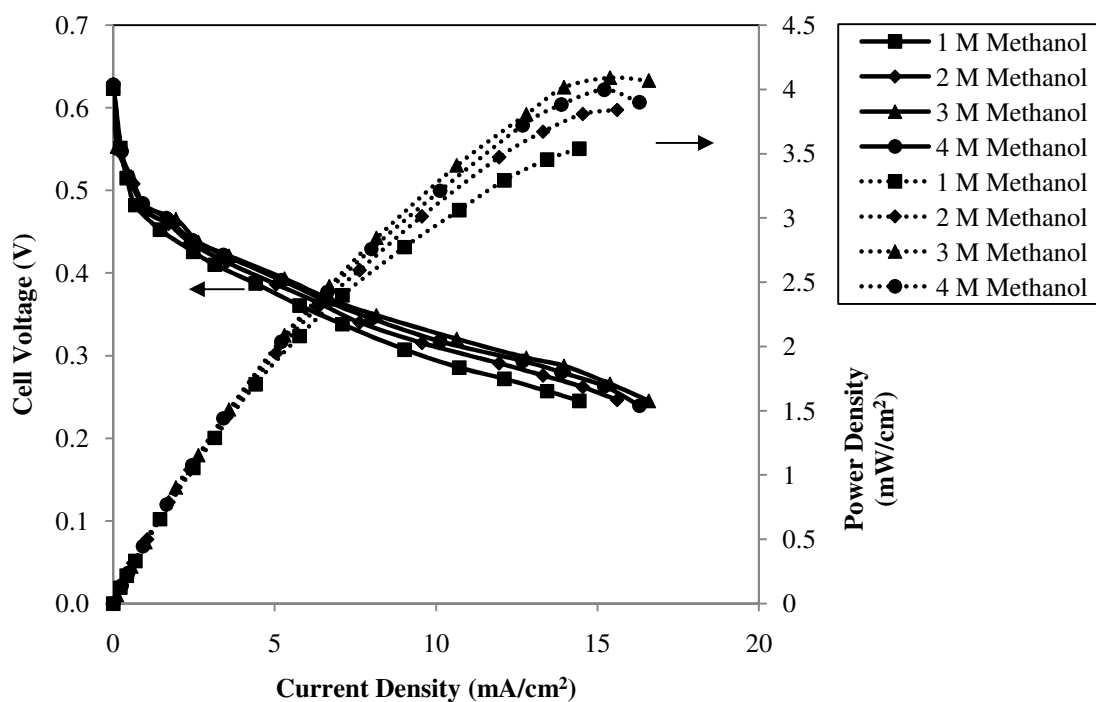


Figure C.4 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 8 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

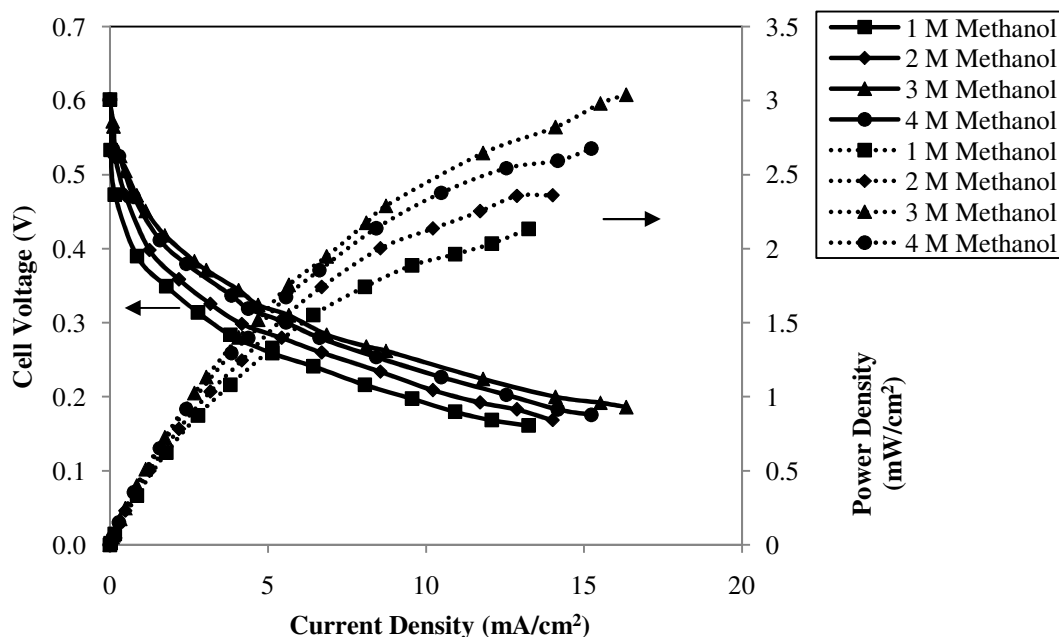
C.2 Effect of methanol concentration at fixed Pt-Ru/C anode loading of 1 mg/cm²

Figure C.5 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 2 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

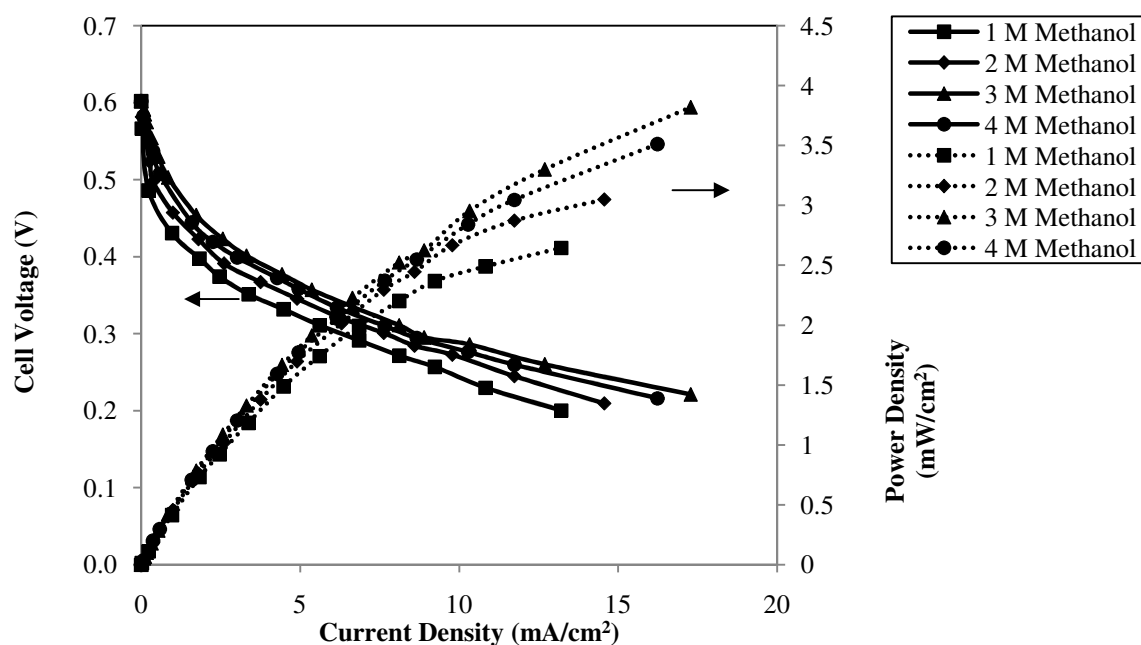


Figure C.6 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 4 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

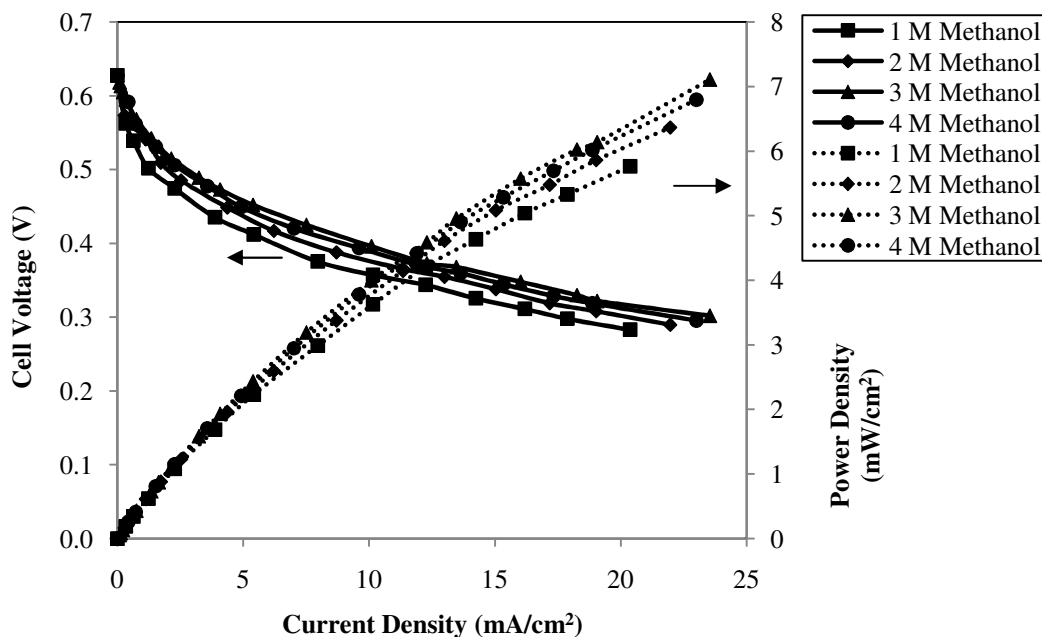


Figure C.7 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 6 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

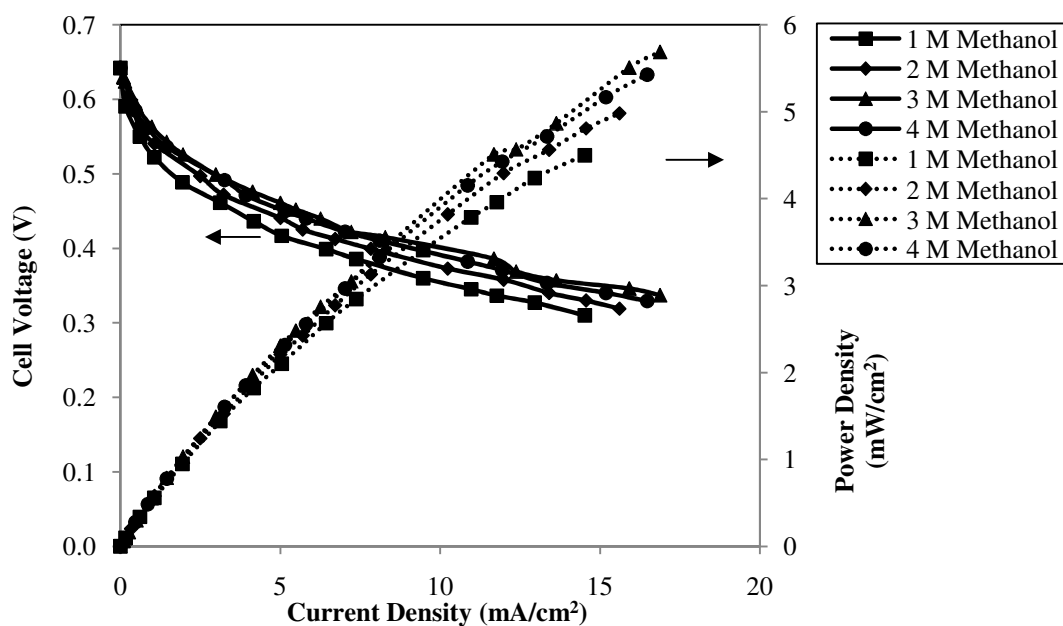


Figure C.8 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 8 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

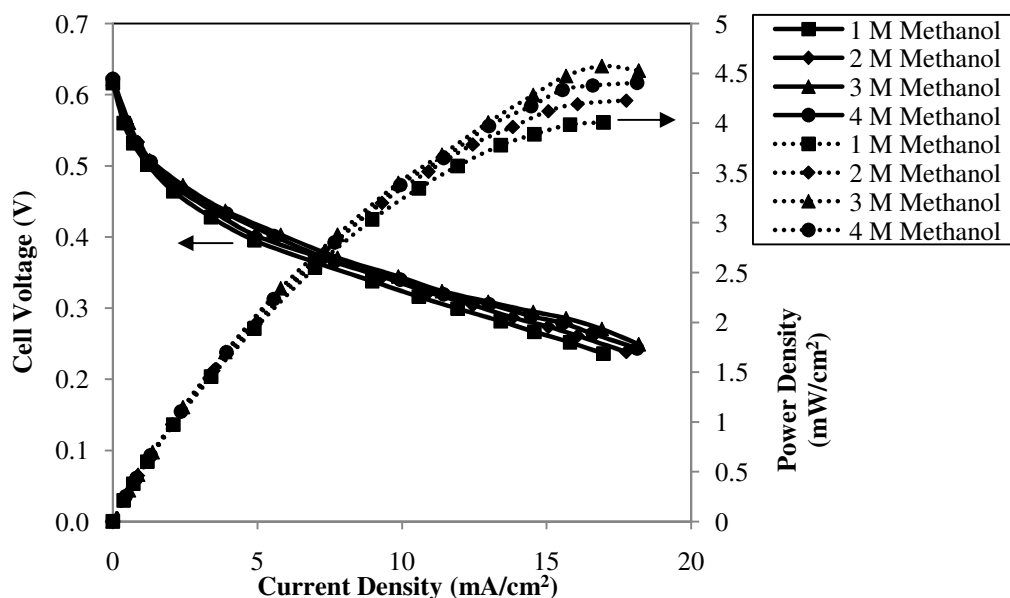
C.3 Effect of methanol concentration at fixed Pt-Ru/C anode loading of 1.5 mg/cm²

Figure C.9 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 2 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

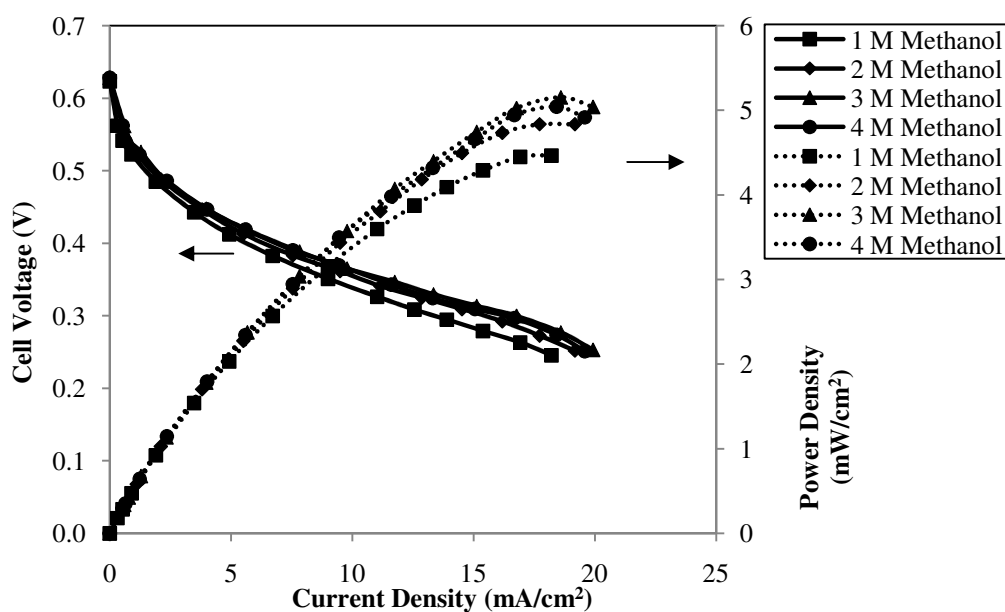


Figure C.10 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 4 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

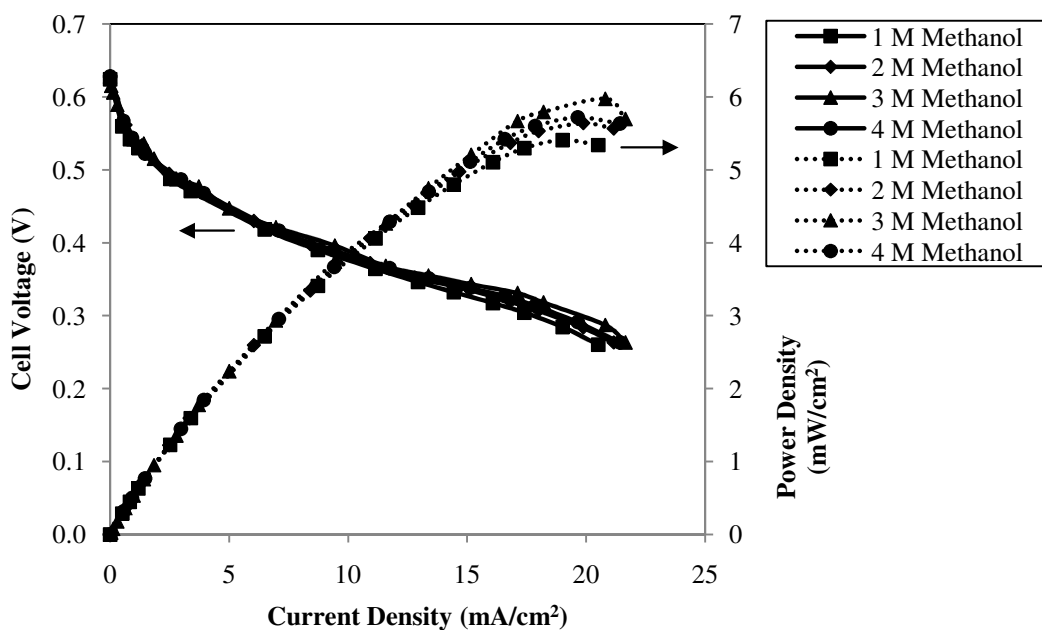


Figure C.11 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 6 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

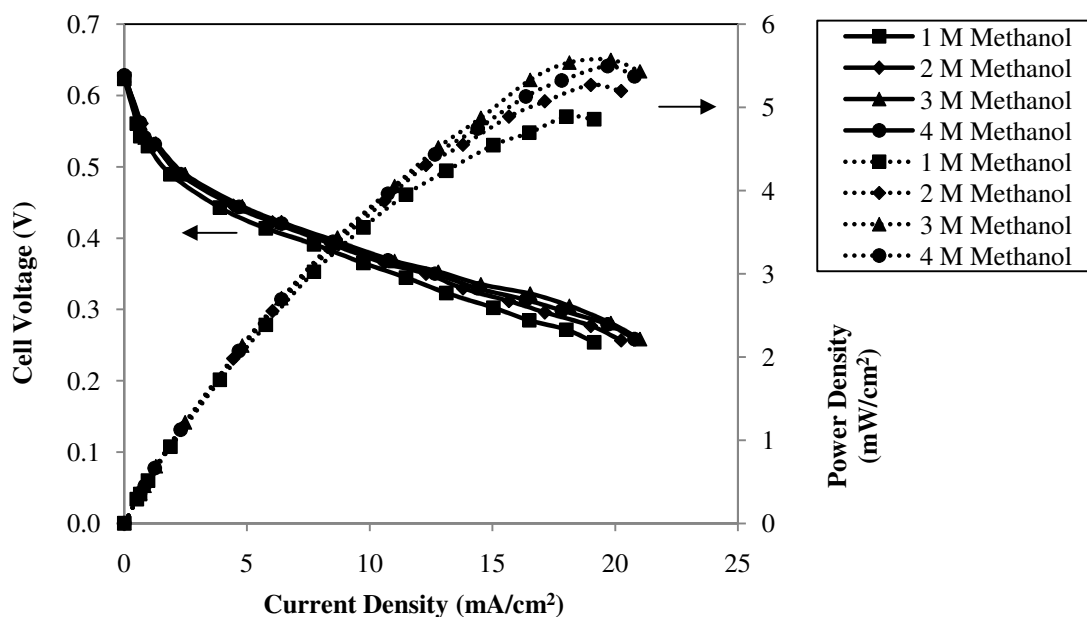


Figure C.12 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 8 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

C.4 Effect of ethanol concentration at fixed Pt-Ru/C anode loading of 0.5 mg/cm^2

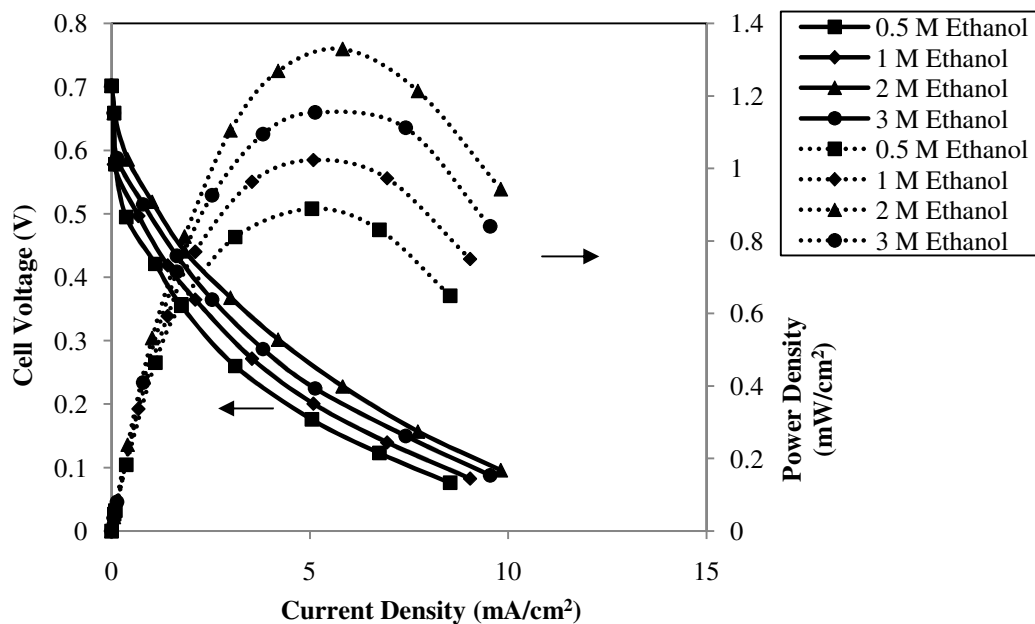


Figure C.13 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 0.5 M KOH at a temperature of $30 \text{ }^\circ\text{C}$; Dotted line-power density curves; Solid line-polarization curves.

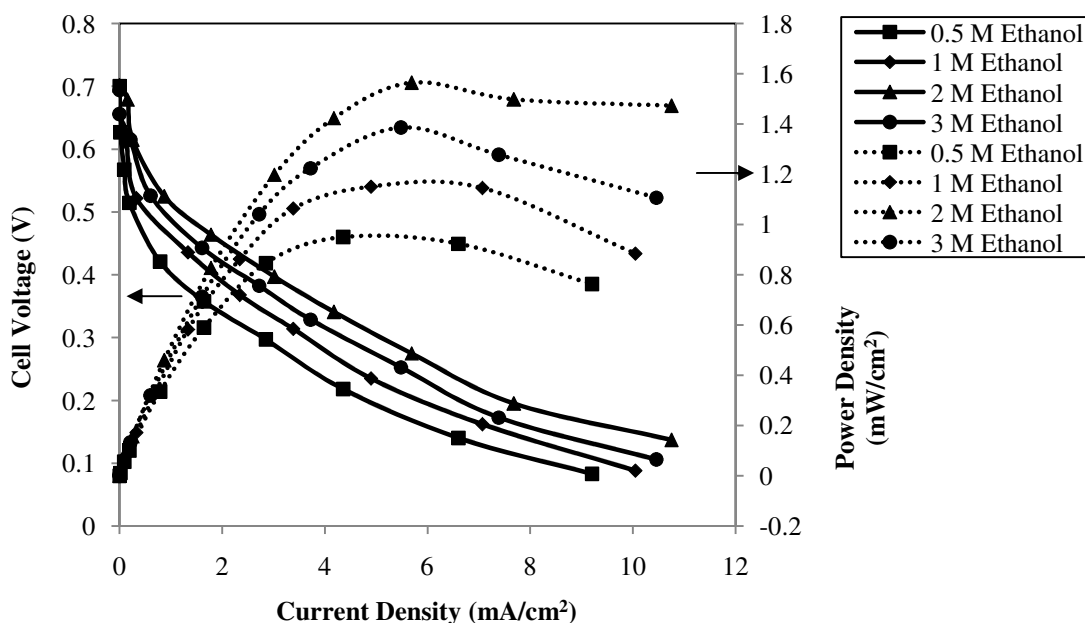


Figure C.14 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 1 M KOH at a temperature of $30 \text{ }^\circ\text{C}$; Dotted line-power density curves; Solid line-polarization curves.

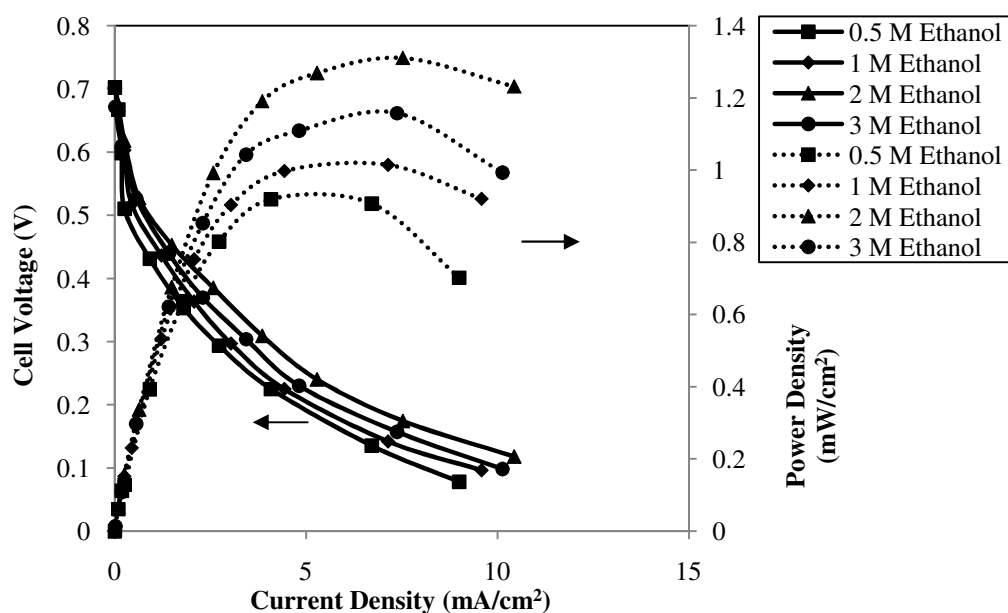


Figure C.15 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 1.5 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

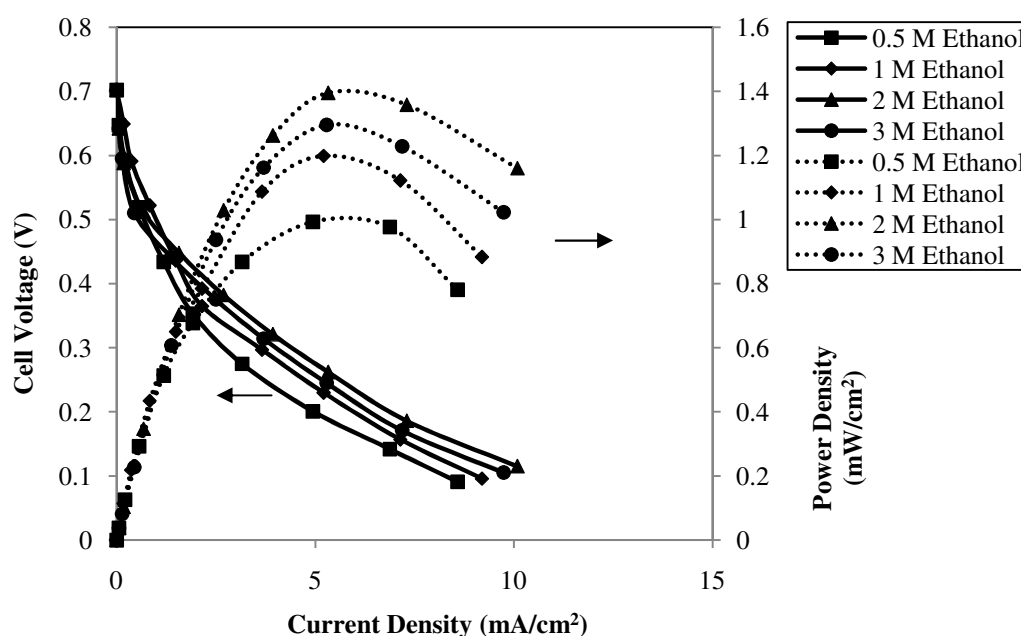


Figure C.16 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 2 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

C.5 Effect of ethanol concentration at fixed Pt-Ru/C anode loading of 1 mg/cm^2

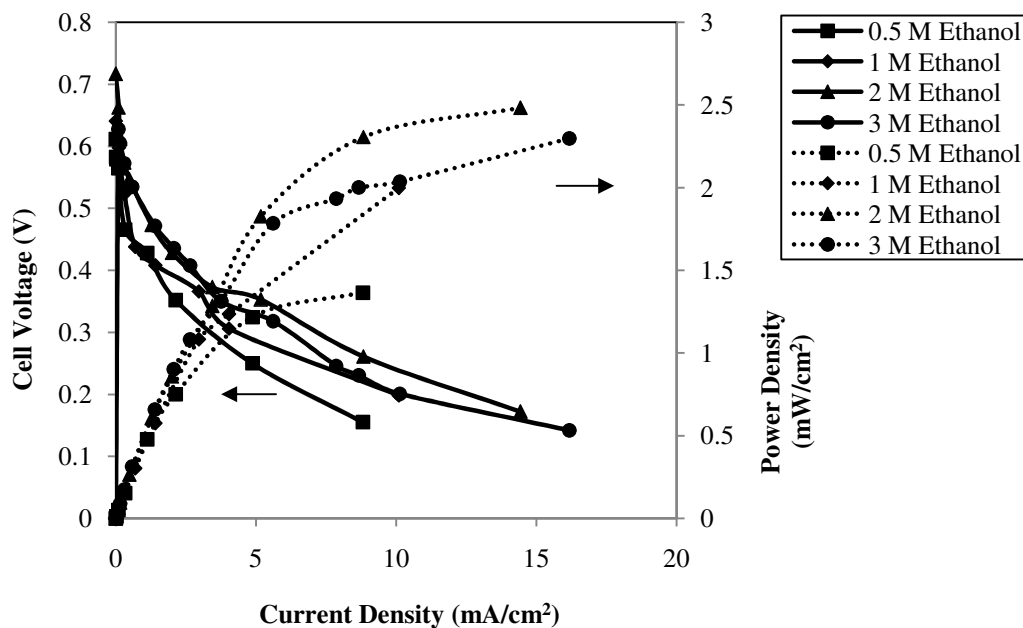


Figure C.17 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 0.5 M KOH at a temperature of $30 \text{ }^\circ\text{C}$; Dotted line-power density curves; Solid line-polarization curves.

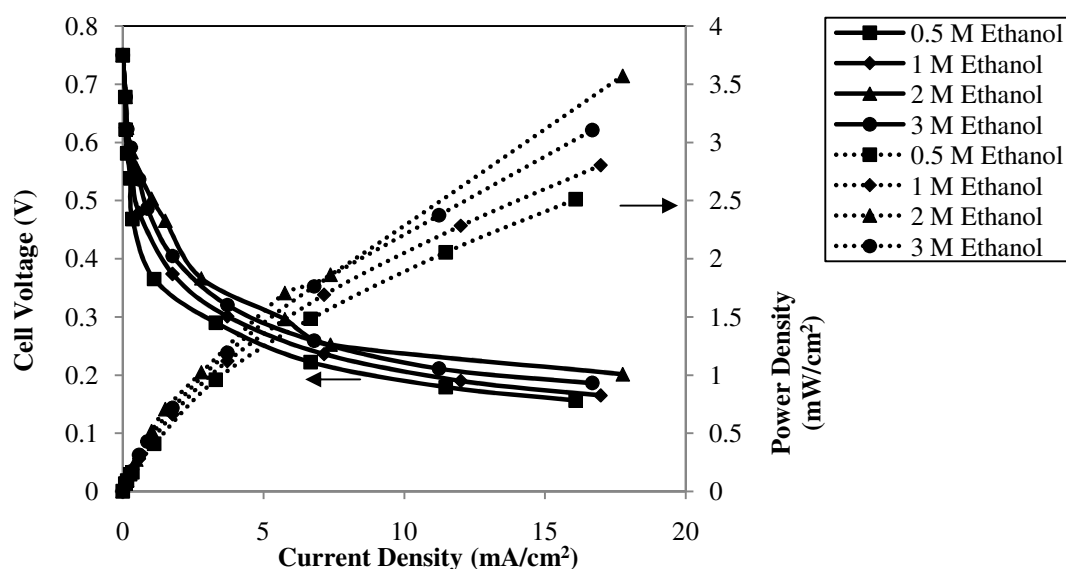


Figure C.18 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 1 M KOH at a temperature of $30 \text{ }^\circ\text{C}$; Dotted line-power density curves; Solid line-polarization curves.

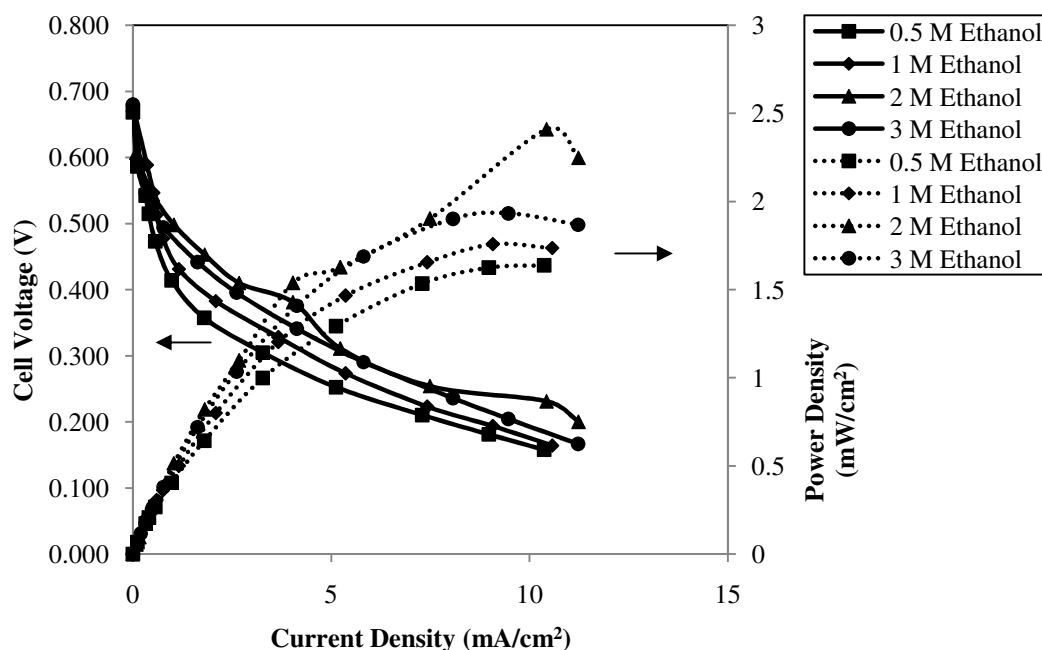


Figure C.19 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 1.5 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

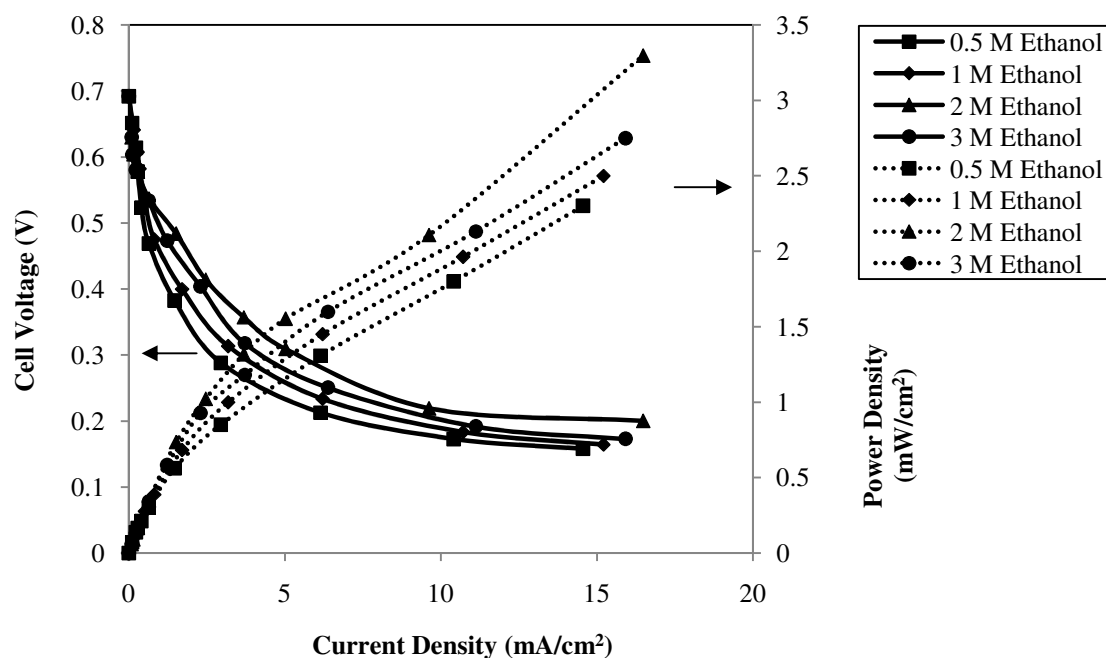


Figure C.20 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 2 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

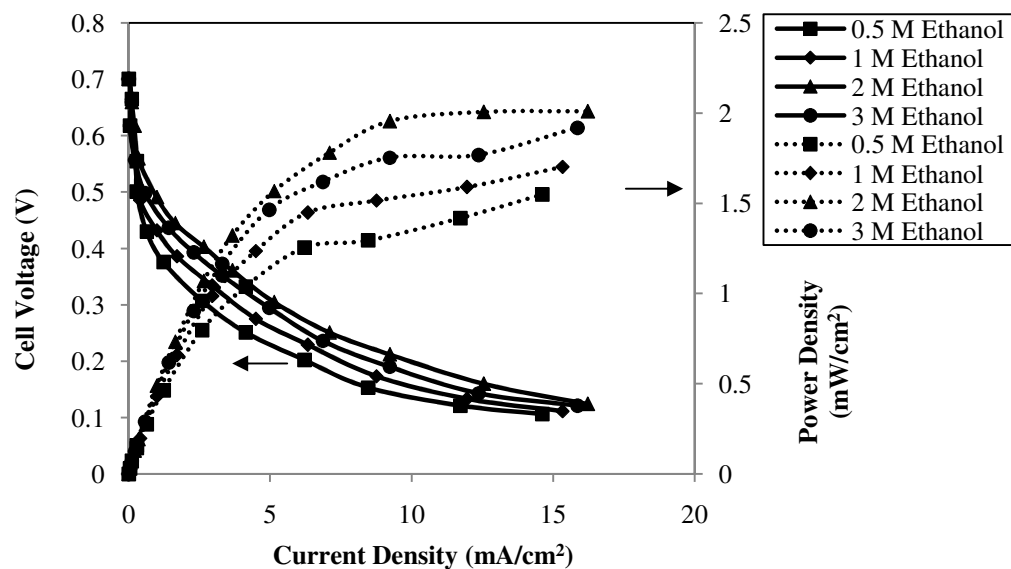
C.6 Effect of methanol concentration at fixed Pt-Ru/C anode loading of 1.5 mg/cm^2 

Figure C.21 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 0.5 M KOH at a temperature of $30 \text{ }^\circ\text{C}$; Dotted line-power density curves; Solid line-polarization curves.

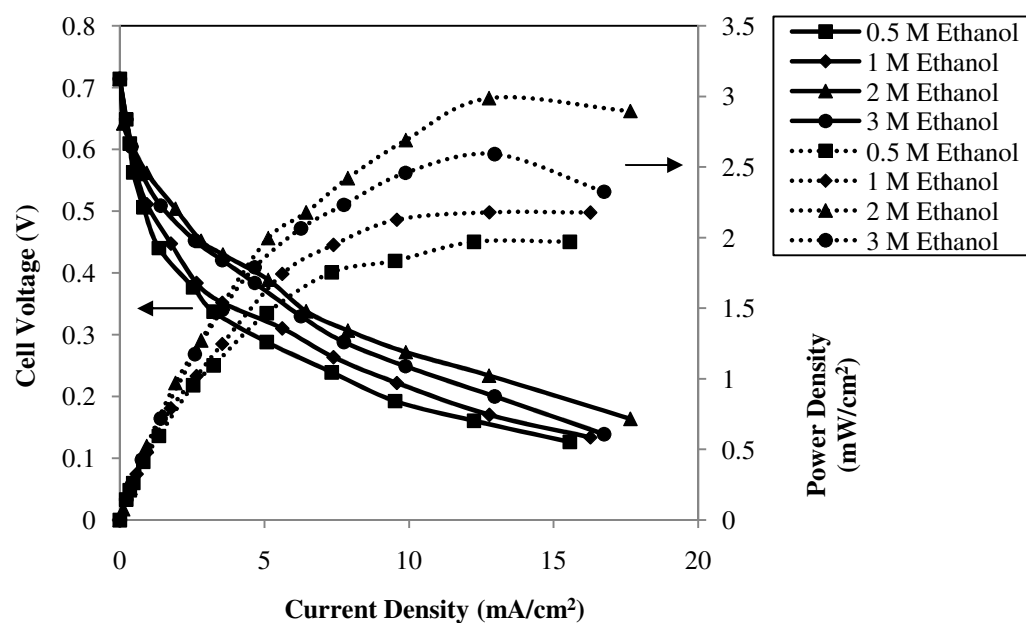


Figure C.22 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 1 M KOH at a temperature of $30 \text{ }^\circ\text{C}$; Dotted line-power density curves; Solid line-polarization curves.

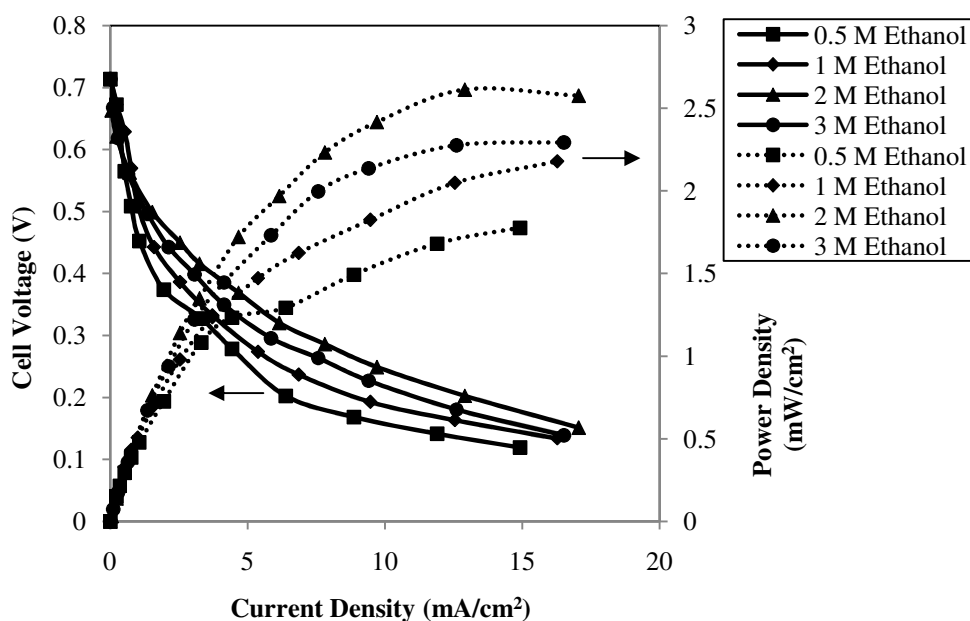


Figure C.23 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 1.5 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

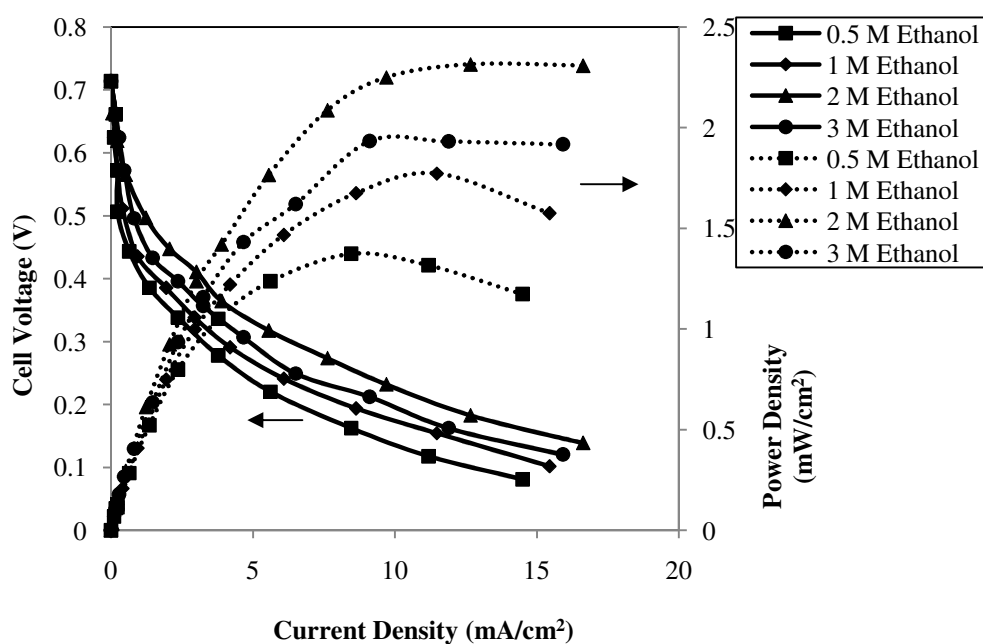


Figure C.24 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 2 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.