

APPENDIX B

The laboratory synthesized physical crosslinked PVA membrane was used for MEA fabrication and detail single cell study with various loading, fuel and electrolyte concentration were performed. The physical 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:

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

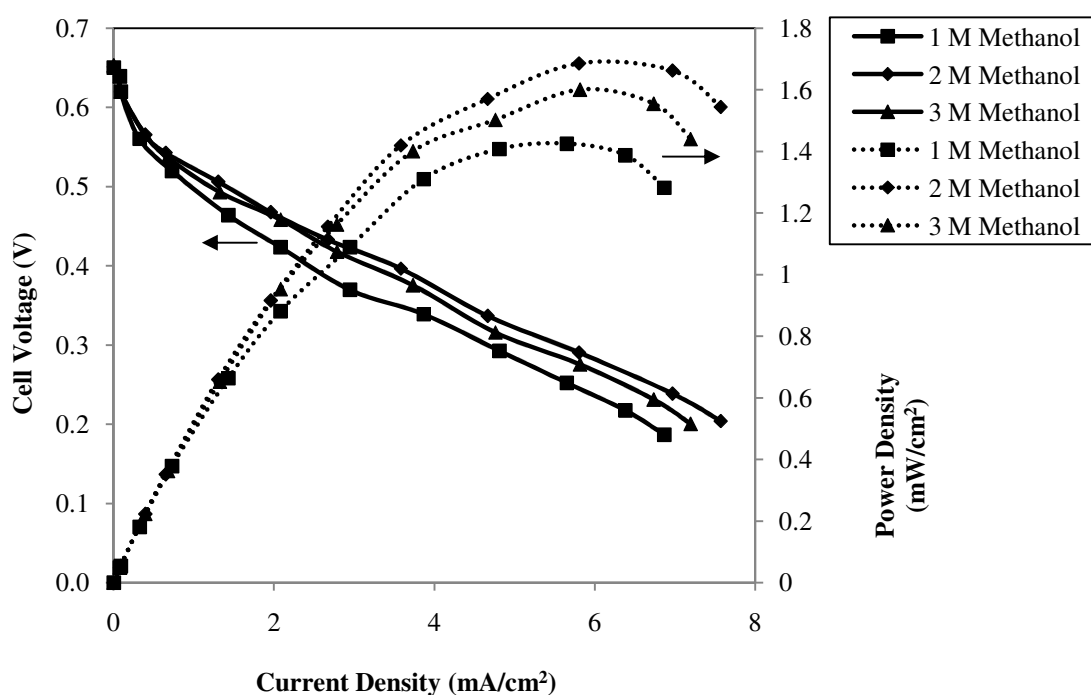


Figure B.1 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 2 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

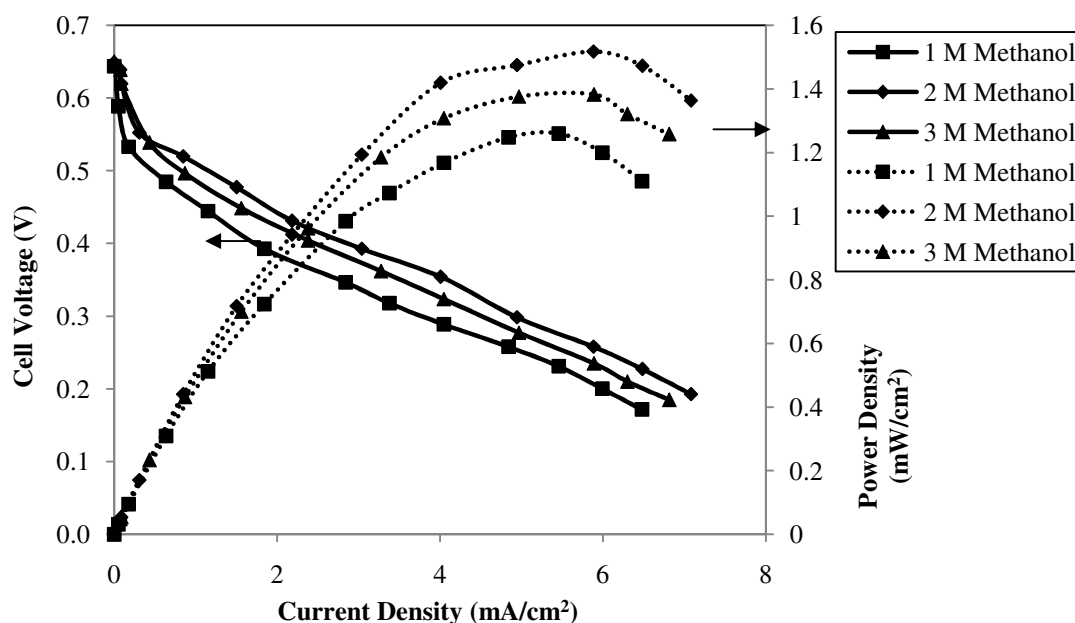


Figure B.2 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 4 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

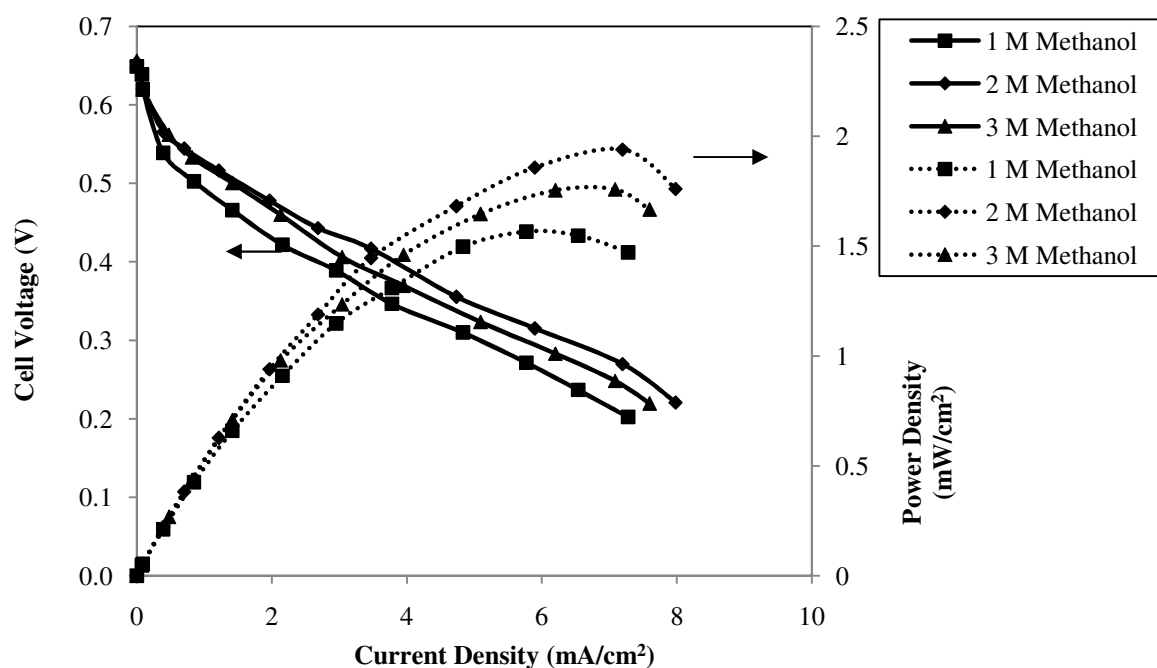


Figure B.3 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 6 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

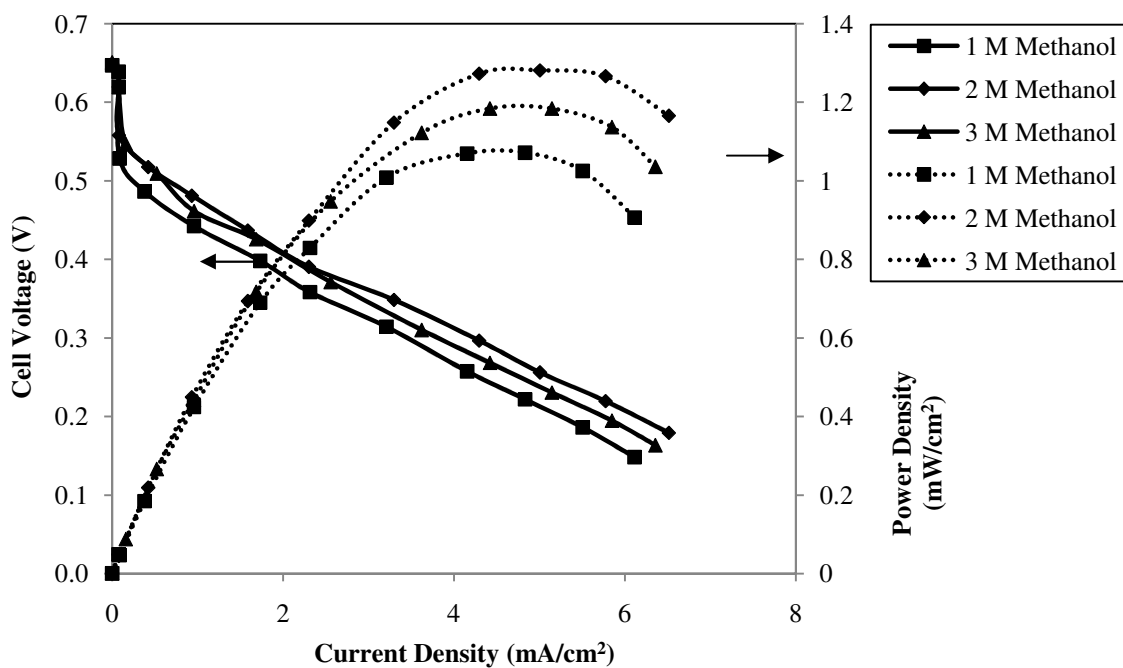


Figure B.4 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 8 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

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

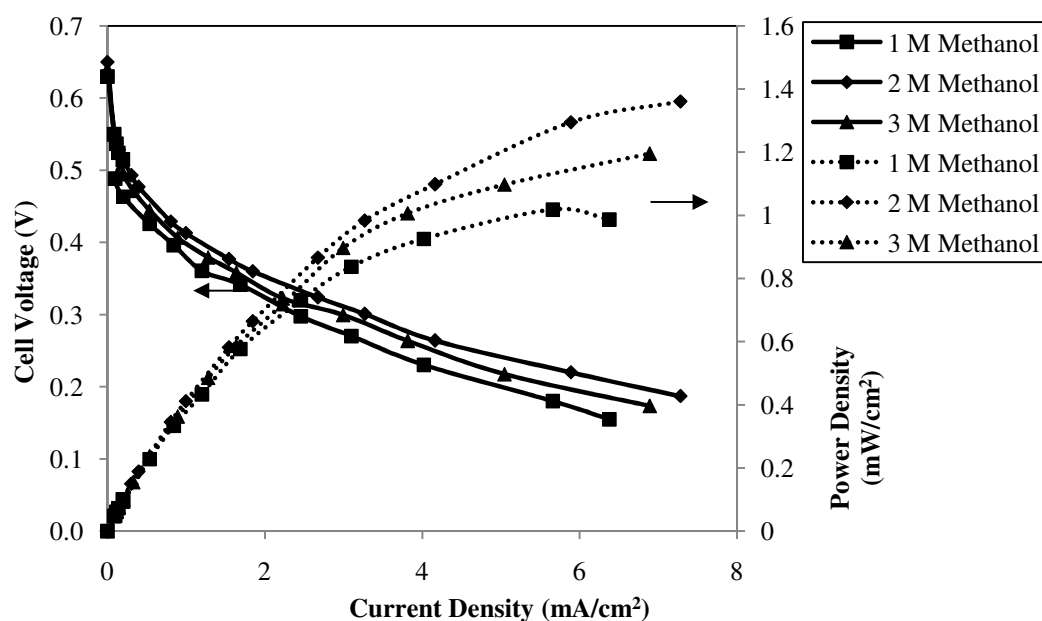


Figure B.5 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 2 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

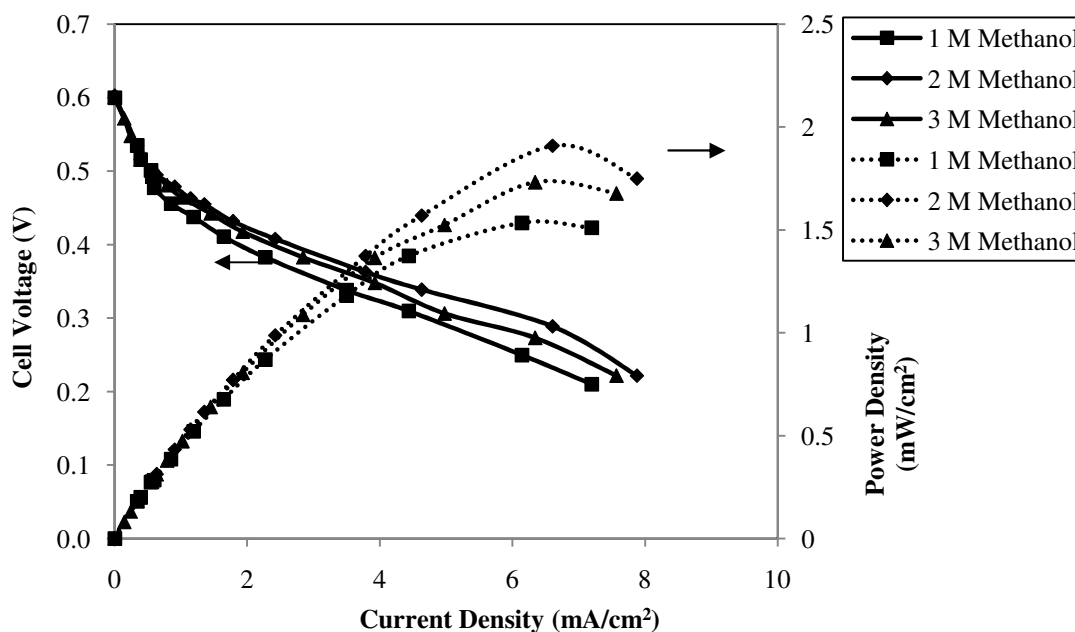


Figure B.6 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 4 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

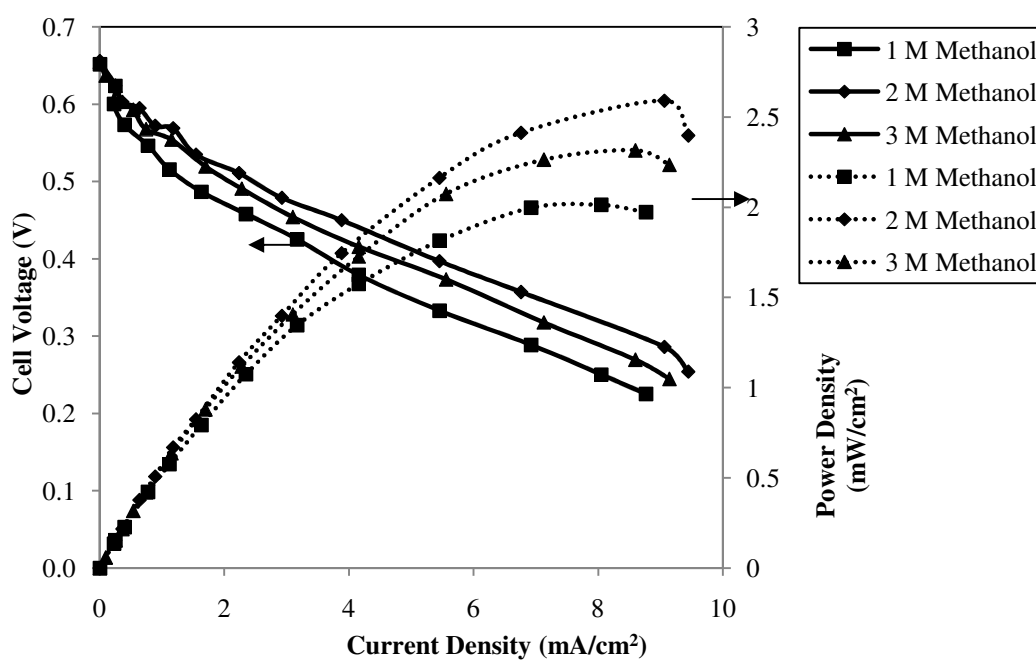


Figure B.7 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 6 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

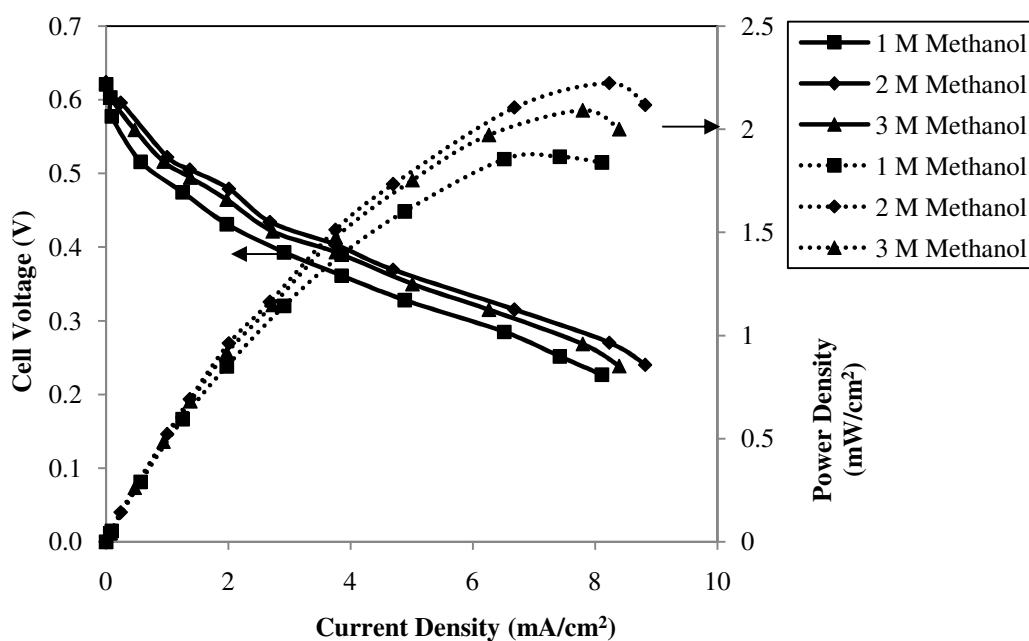


Figure B.8 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 8 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

B.3 Effect of methanol concentration at fixed Pt-Ru/C anode loading of 1.5 mg/cm^2

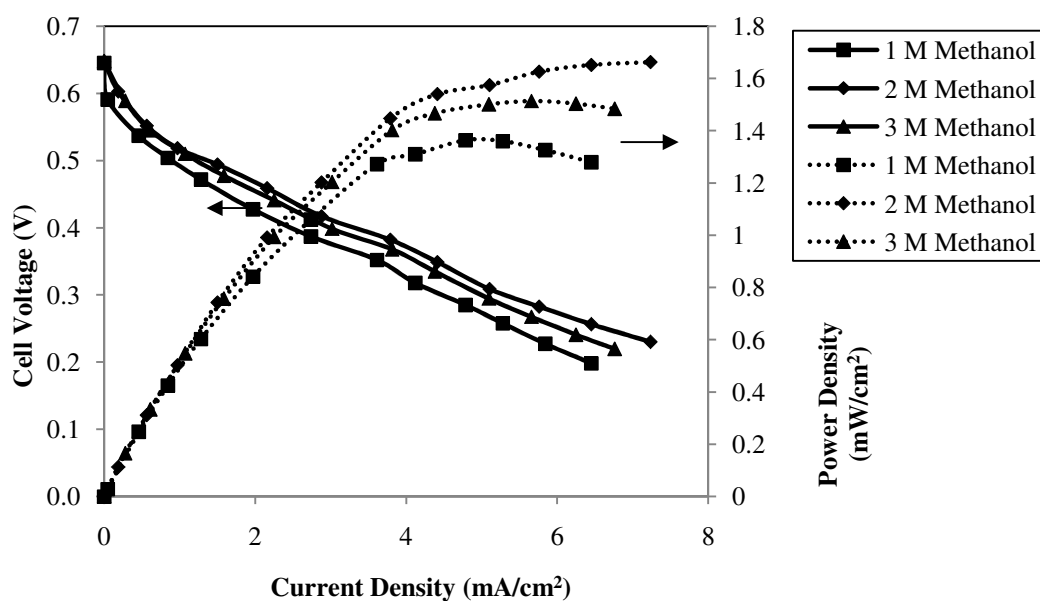


Figure B.9 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 2 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

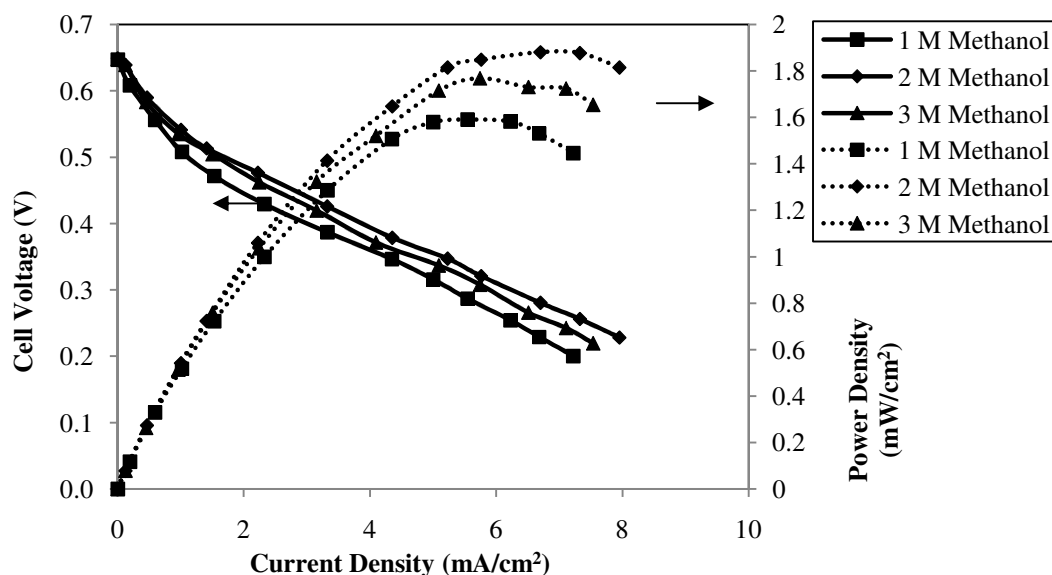


Figure B.10 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 4 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

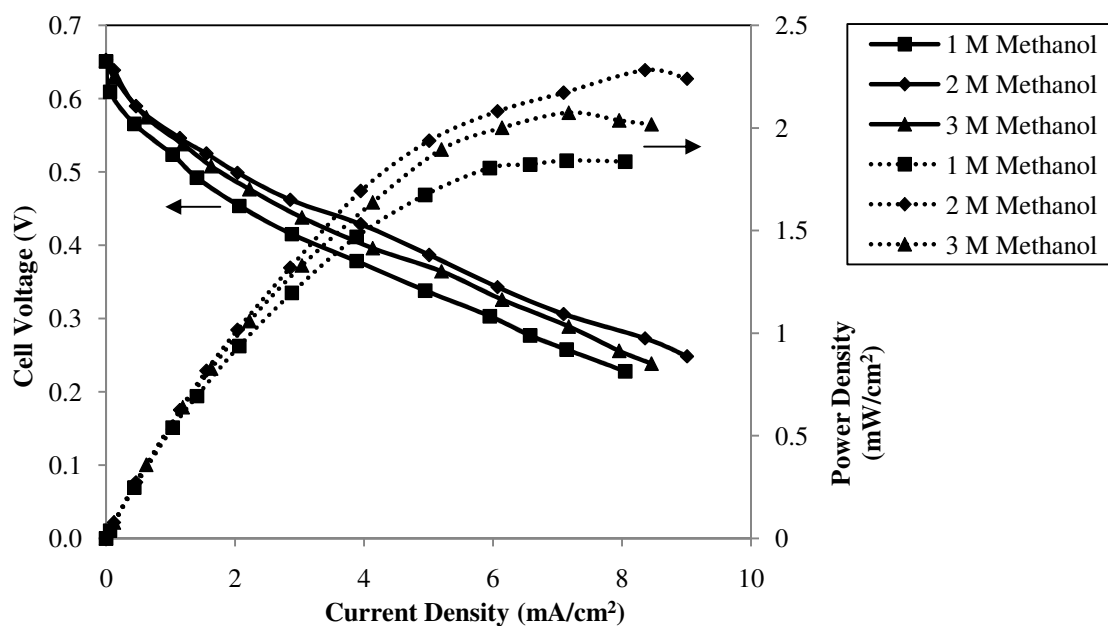


Figure B.11 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 6 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

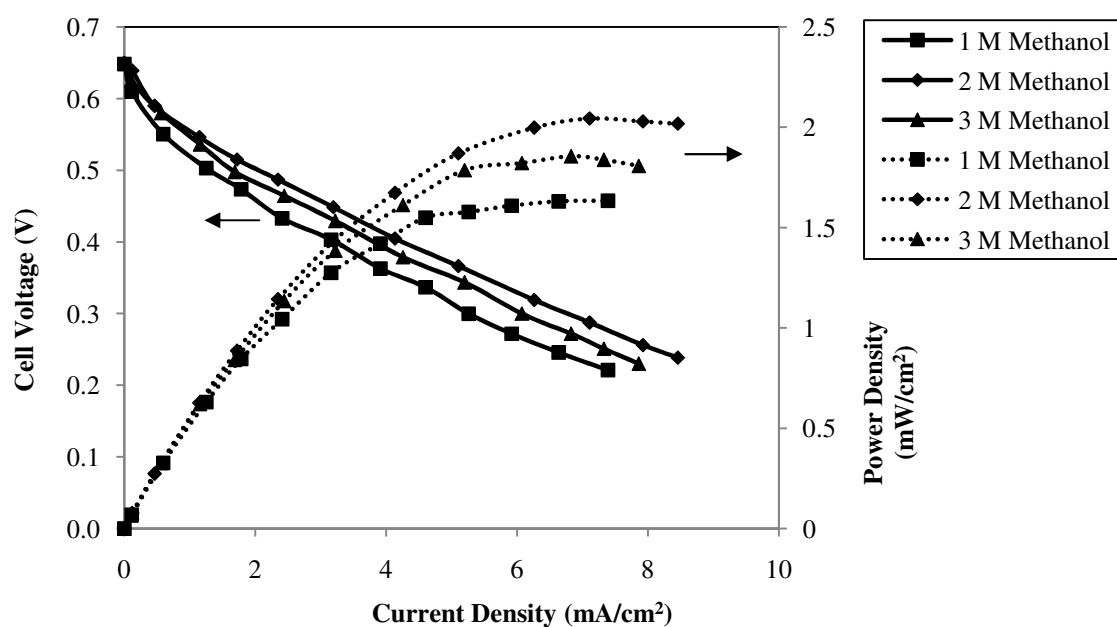


Figure B.12 Current density vs. cell voltage and current density vs. power density characteristics for different methanol concentration using fixed 8 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

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

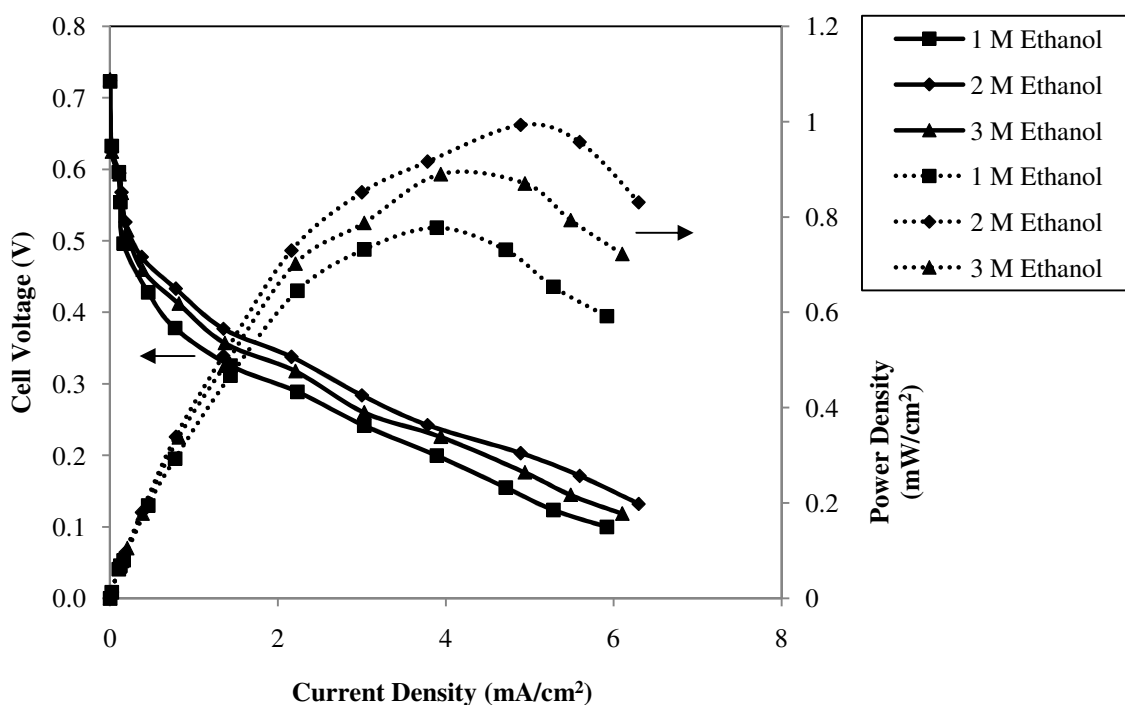


Figure B.13 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 0.5 M KOH at a temperature of $30 \text{ }^\circ\text{C}$; Dotted line-power density curves; Solid line-polarization curves.

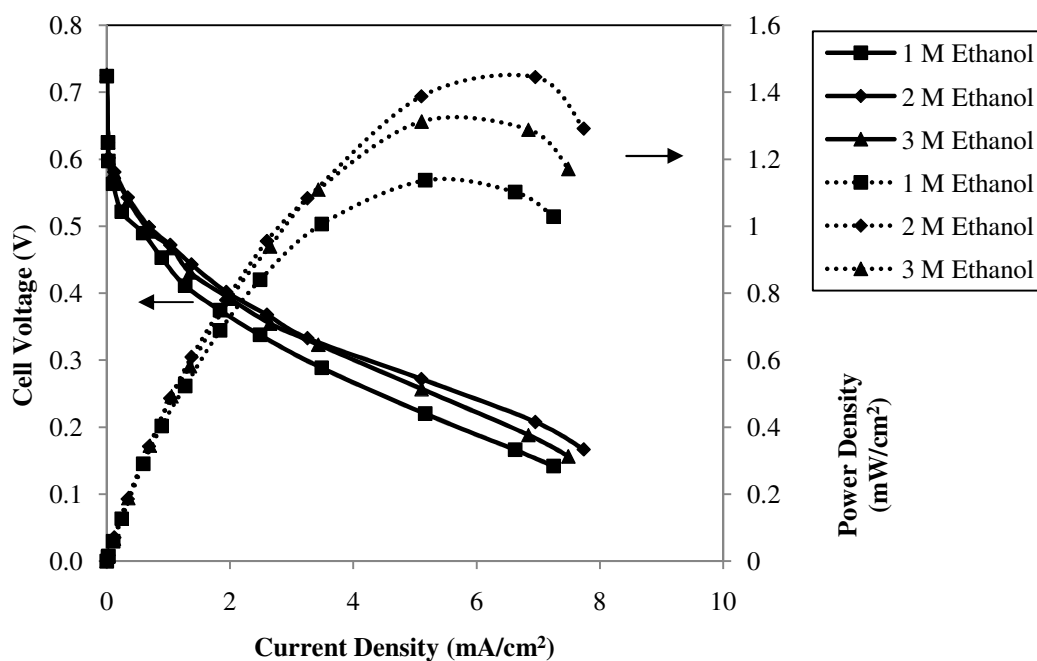


Figure B.14 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 1 M KOH at a temperature of $30 \text{ }^\circ\text{C}$; Dotted line-power density curves; Solid line-polarization curves.

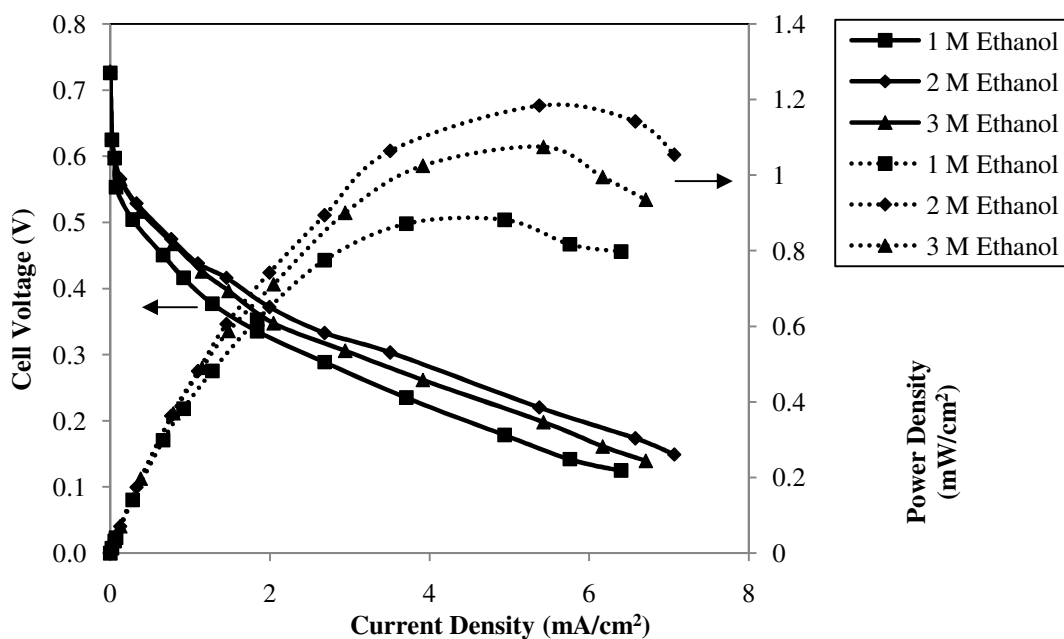


Figure B.15 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 2 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

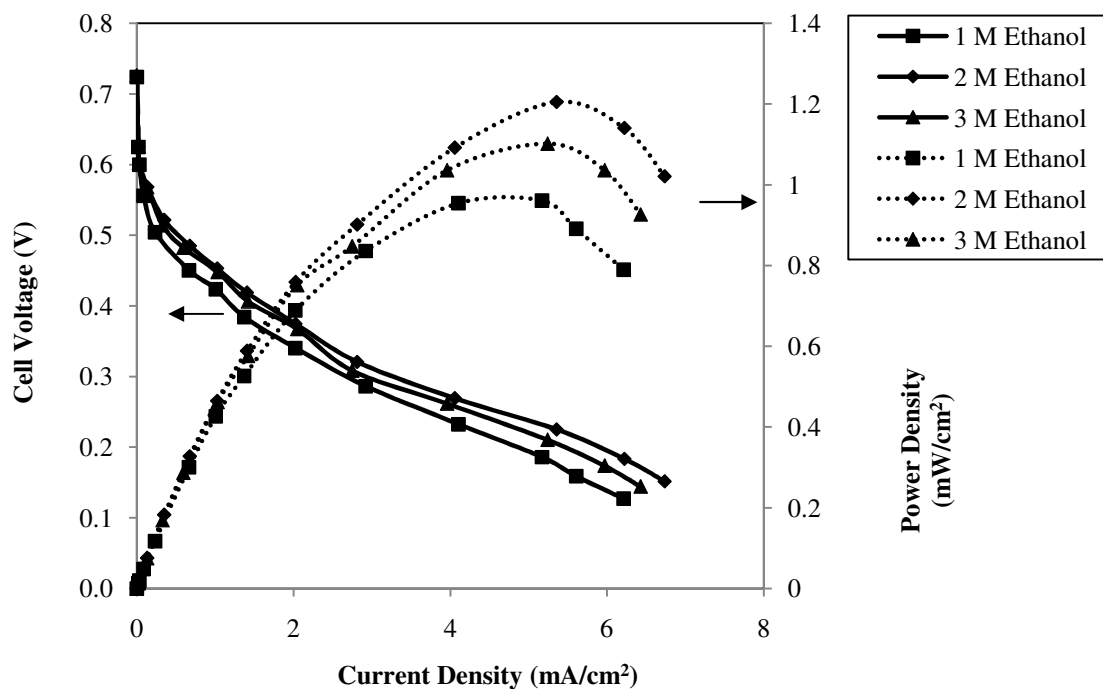


Figure B.16 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 3 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

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

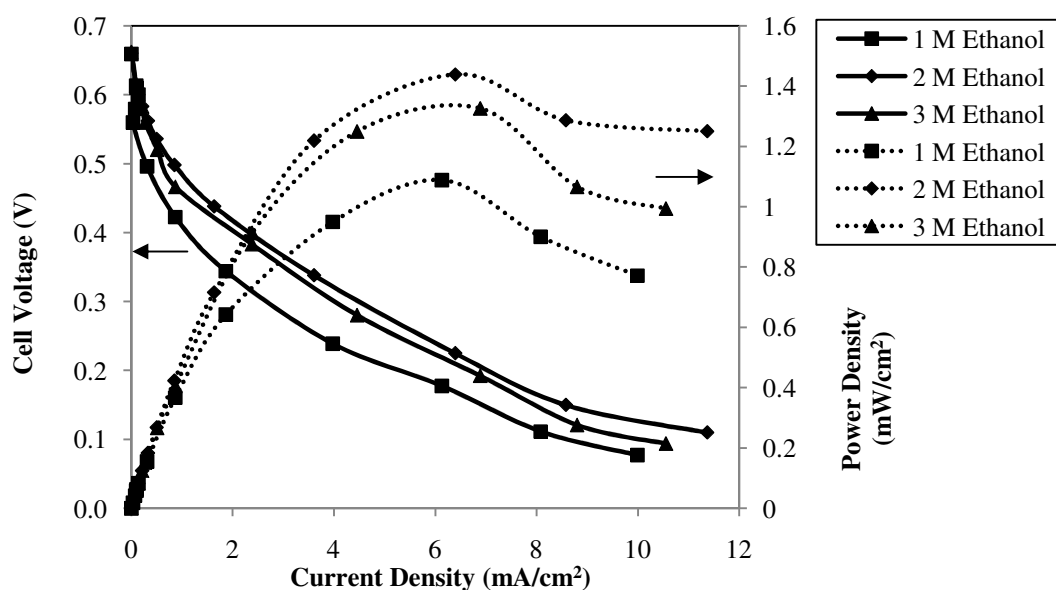


Figure B.17 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 0.5 M KOH at a temperature of $30 \text{ }^\circ\text{C}$; Dotted line-power density curves; Solid line-polarization curves.

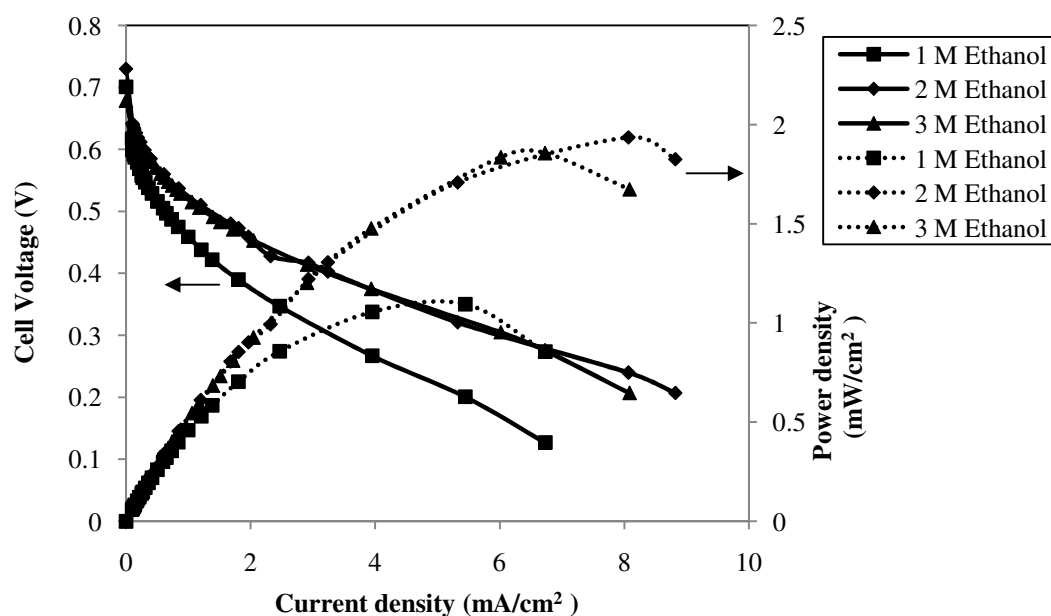


Figure B.18 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 1 M KOH at a temperature of $30 \text{ }^\circ\text{C}$; Dotted line-power density curves; Solid line-polarization curves.

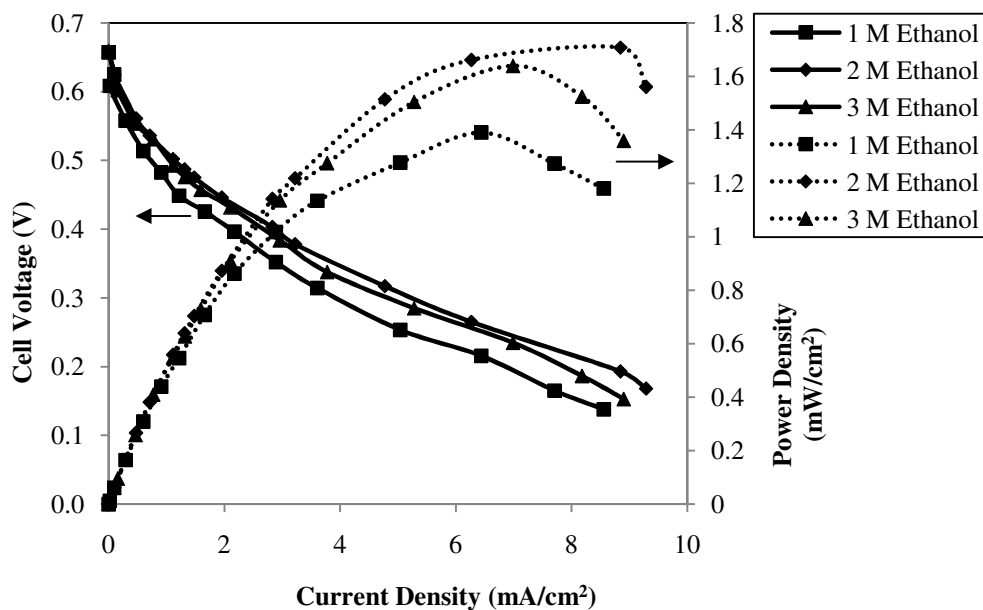


Figure B.19 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 2 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

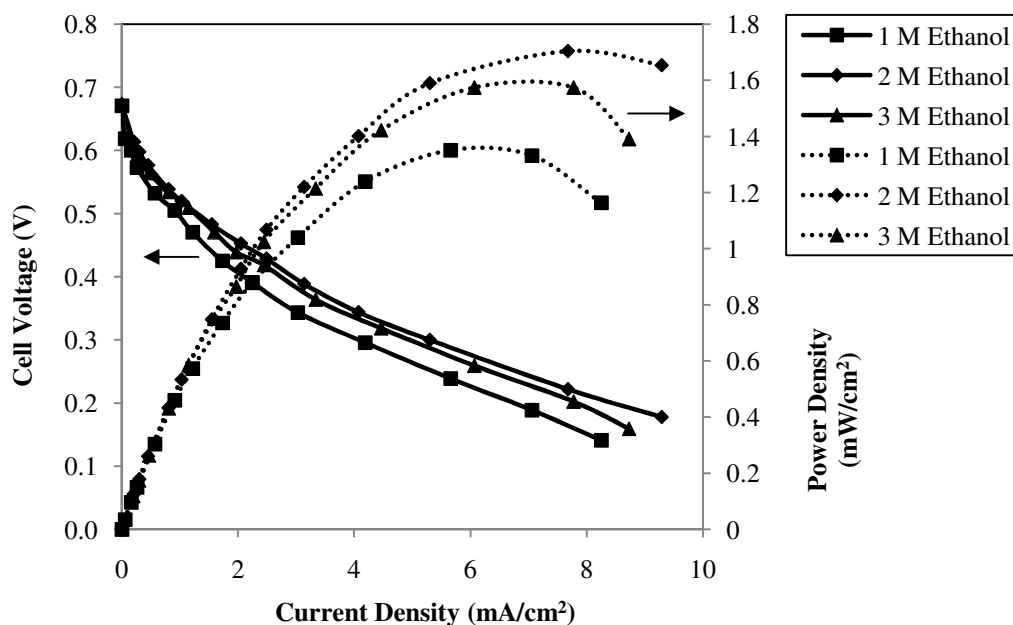


Figure B.20 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 3 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

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

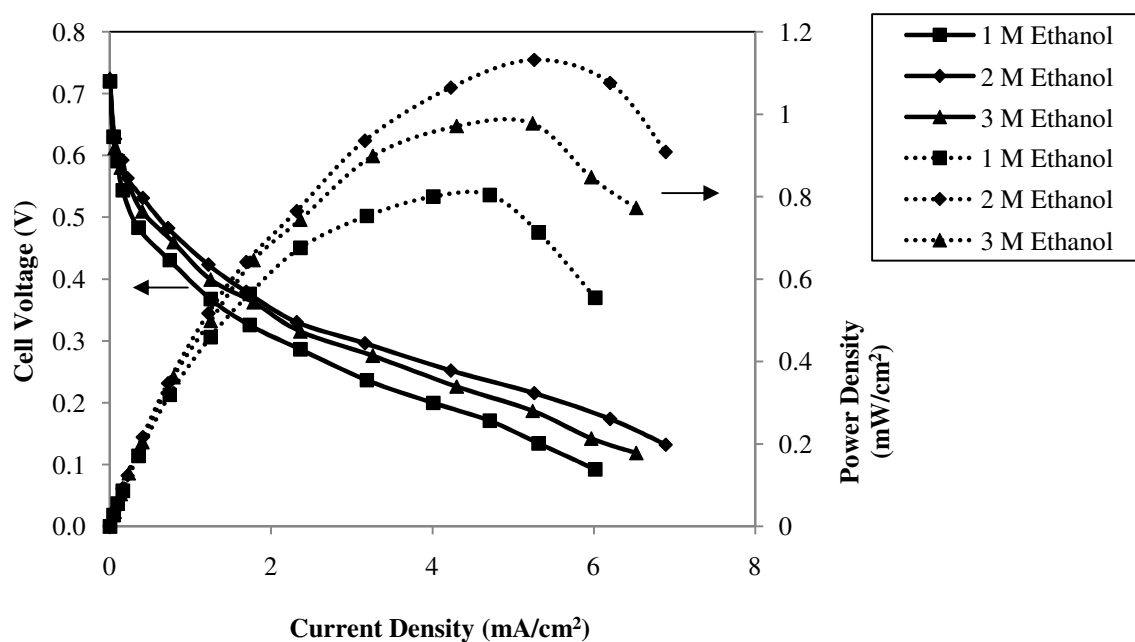


Figure B.21 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 0.5 M KOH at a temperature of 30°C ; Dotted line-power density curves; Solid line-polarization curves.

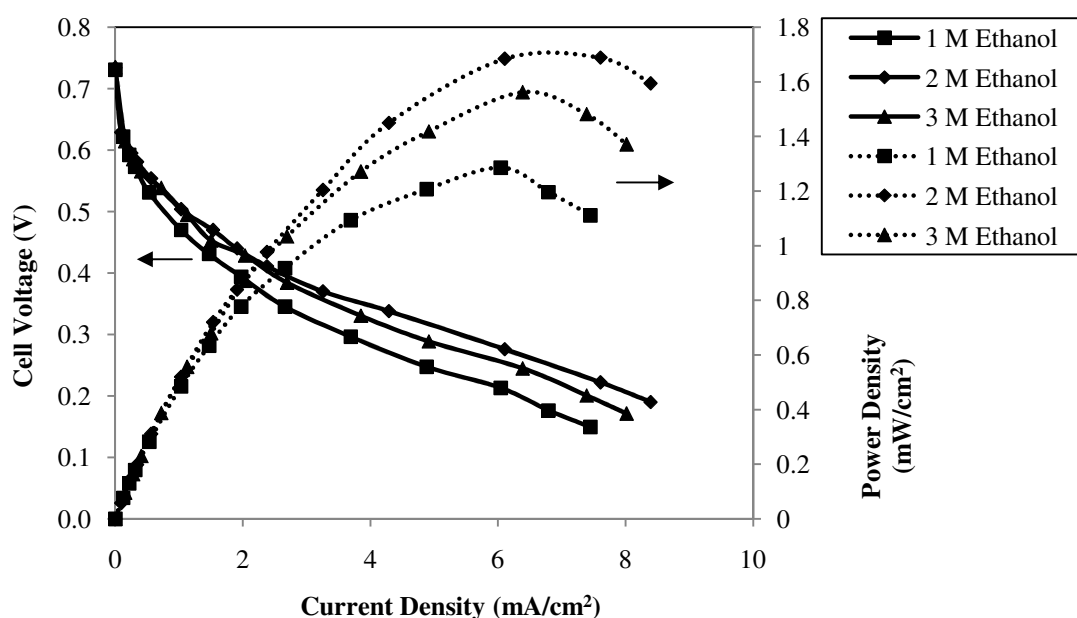


Figure B.22 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 1 M KOH at a temperature of 30°C ; Dotted line-power density curves; Solid line-polarization curves.

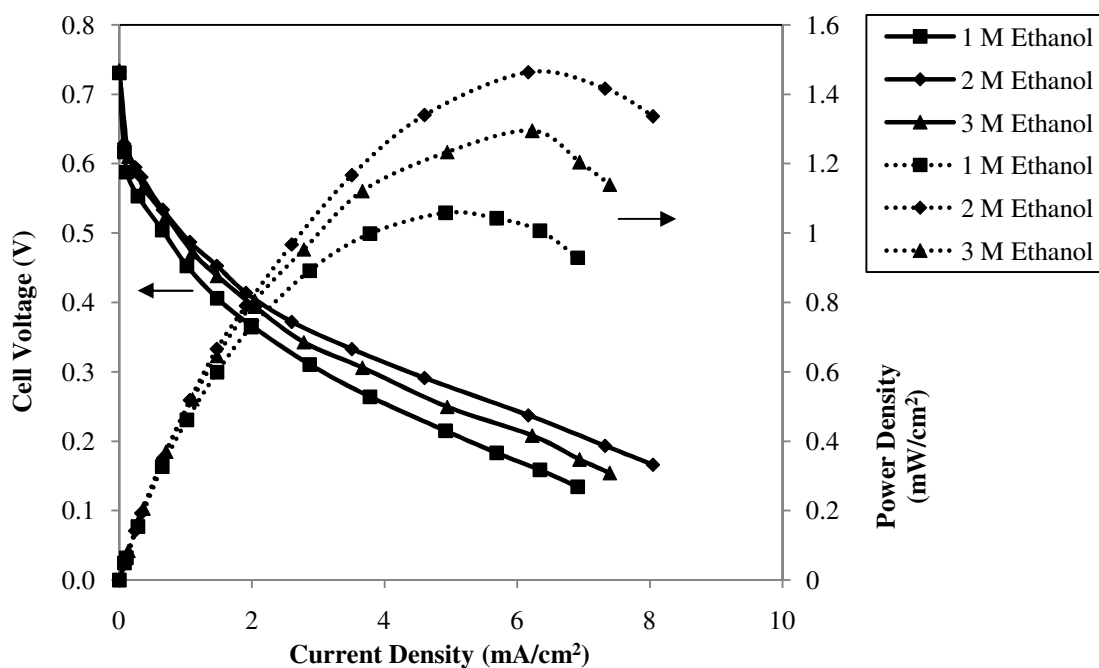


Figure B.23 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 2 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.

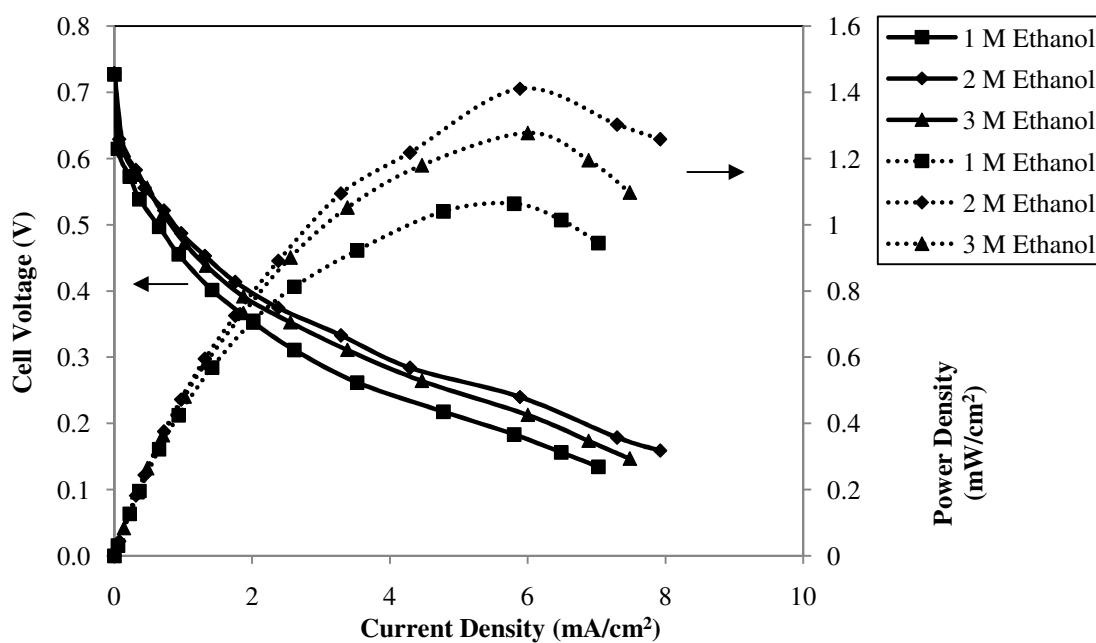


Figure B.24 Current density vs. cell voltage and current density vs. power density characteristics for different ethanol concentration using fixed 3 M KOH at a temperature of 30 °C; Dotted line-power density curves; Solid line-polarization curves.