Investigation on Pyroelectric Ceramic Temperature Sensors for Energy System Applications

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Introduction

Objective:

- To design, fabricate, and test wireless temperature sensors using the principle of pyroelectricity

Methodology & Materials

Rationale:

Sensor fabrication:

- Materials: Pyroelectric ceramic: Lithium niobate (LiNbO3)
- Binder: Polyvinyl alcohol (PVA)
- Process:
  - Ceramic compressed at 3 metric tons
  - Cured at 150°C for 120 minutes

Testing:

- Tests performed:
  - Hall effect sensor demonstration
  - Signal interference testing
  - Pyroelectric ceramic testing

Results

Sensor fabrication:

- Different geometries were achieved
- Cracked surfaces observed on certain samples
- Silver painting of the commercial sample

Testing results:

Testing results:

- Hall sensor voltage vs thermoelectric temperature gradient
- Signal loss was found when using steel alloys

Conclusion

- The first stage of the sensor fabrication was carried out successfully
- The Hall effect sensor concept was demonstrated using a thermoelectric sensor
- Voltage change in the Hall effect sensor can be used for temperature sensing
- Signal loss was found when using steel alloys

Future Work

Students Involvement

Acknowledgements

References