**Dielectric Property Estimation of Paraffin Wax Solid from Signal Measurement of an Optical Fourier Domain Imaging System.**

Rodney N. Abugre,Department of Physics, University of Ghana, Accra, Ghana.

Joanna Modupeh Hodasi, Department of Physics, University of Ghana, Accra, Ghana.

Miriam Abade Abugre, Ashesi University College, Ghana.

# Introduction

Estimation of the dielectric properties of materials for material characterization has potential applications in a wide range of fields such as Biomedical engineering, Food science and more. In this article, we discuss a free-space microwave technique known as Optical Fourier Domain Imaging (OFDI) for the estimation of the dielectric properties of paraffin wax solid by application of Kramers-Krogin (K-K) relation and Debye Model to detected signal measurement.

# Methods

OFDI system is implemented with Paraffin Wax Solid as sample. The detected signal measurement is analysed with Fourier analyzer sofware to generate an interferogram on which both K-K relation and Debye model is applied. Simple microwave experiment using Snell’s Law is performed and results obtained is compared to that obtained from application of K-K relation and Debye Model to the detected signal measurement.

# Results

The actual signal of sample obtained from the difference in the interferogram for sample present and sample absent in the OFDI system was Guassian shaped. The estimated dielectric property upon application of K-K relation and Debye model to detected signal measurement had real and imaginary components to be $\left(3.2278 \& 0.4758\right)$ and$ (3.1566 \& 0.4000)$ respectively.

# Conclusion

The actual signal measurement indicates OFDI system detected the presence of Parafin Wax Solid. Application of K-K relation and Debye model to the generated interferogram of the actual signal measurement results in real and imaginary dielectric constants that are approximately same to one (1) decimal place. Comparing estimated values obtained to that from a simple direct microwave experiment showed some slight deviation of about 0.3 indicating a percentage deviation less than 10%.