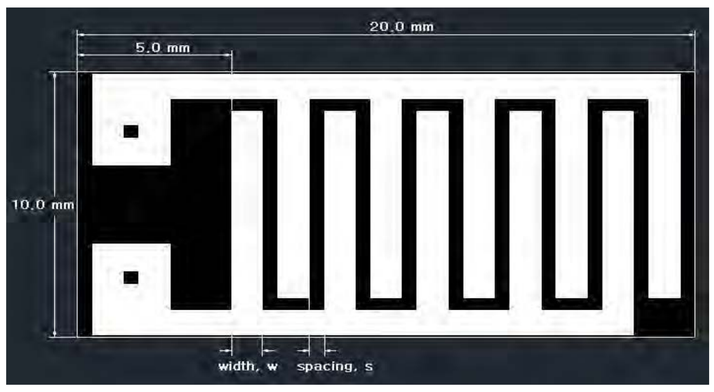
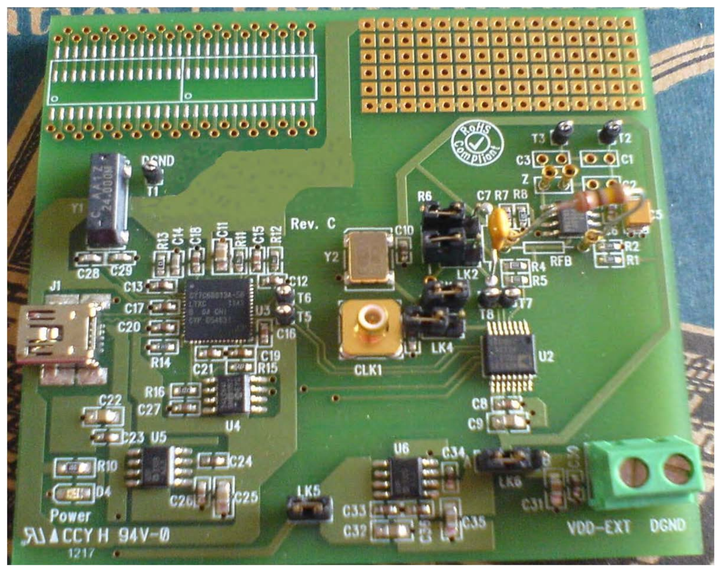
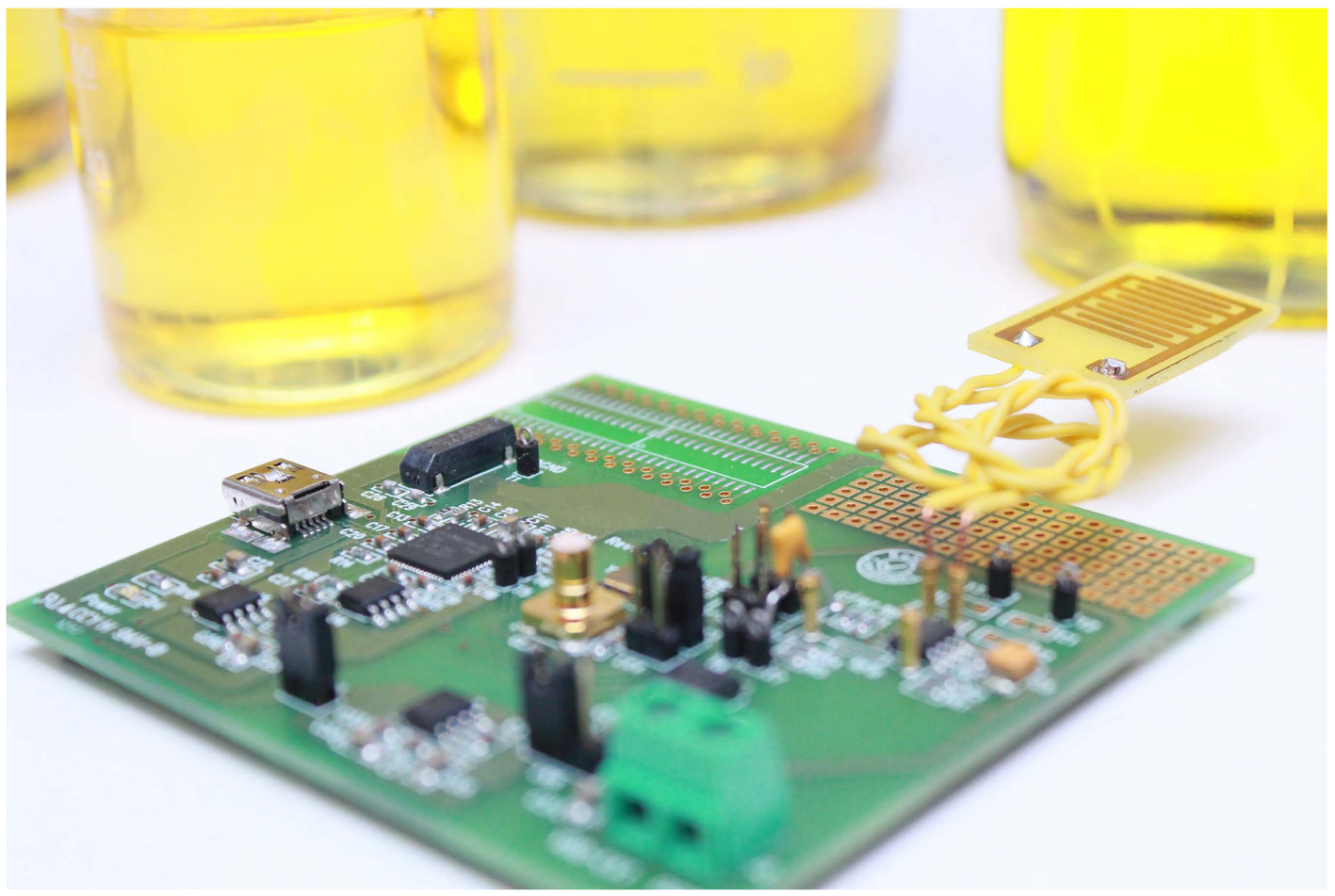
LARD DETECTION BASED ON IMPEDANCE SPECTROSCOPY

Patent No. : PI2015702503







BACKGROUND

- Halal verification technologies has been around for years, but mostly are based on non-electrical properties sensing which requires long hours of laborious steps on huge lab-based equipments. These technologies requires complex chemical preparation using expensive reagents, primers and solutions. This leads to these technologies becoming costly and time consuming.
- Hence, we developed a device, system and method based on impedance spectroscopy that provides a rapid and immediate result particularly in distinguishing lard from other animal fats. This invention is able to transform the current Halal verification system.

INVENTION

Spectroscopic analysis uses the interaction of electromagnetic wave with molecules to provide chemical and physical information of the material. Different fats is build from different chains of molecules, and each molecules react differently to electromagnetic waves, thus the impedance properties of mixture of various molecules of different fats will uniquely identify them. The device projects a series of frequencies to the sample and a sensor collect the reflected frequency from the sample. The device calculates the impedance of the sample towards the different frequencies projected.

BENEFITS

- Produces faster time response for detection and classification of animal fats and plant oil.
- Usable in the verification of lard free food.
- Extraction of fat is less complex for users thus becomes more consumer friendly.
- The device is smaller in size thus making it portable.
- There is no expensive chemical used, making it having perpetual shelve life and cost effective.

POTENTIAL CONSUMERS

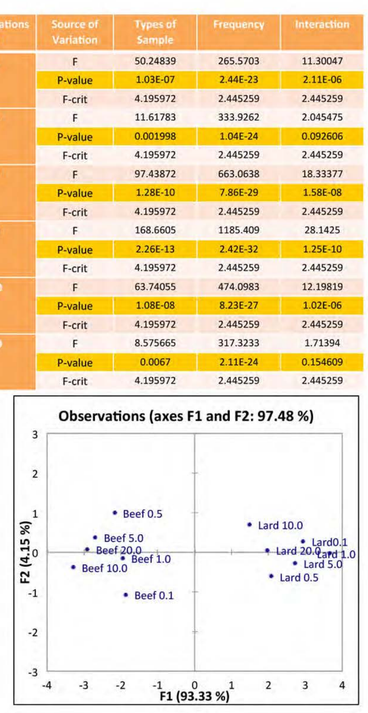
- Research Institutes
- Universities
- Muslim Food Manufacturing
- Halal Aunthentication Officers

FEATURES

- For data acquisition, an optimized interdigitated electrode is designed.
- Electronic board comprise of ; a signal conditioning circuitry for converting voltage signal into digital signal, an impedance converter network analyzer to generate an impedance value readings, a processing unit that generates output data according to a pattern, a memory to record the output data and an integrated display unit to display the output.
- A classification software is programmed in the processing unit for determining the fat origin in the sample of animal fat based on the measured impedance.
- Other than having USB port for real time information sharing with other devices, the device can be connected to smart phone wirelessly through Bluetooth or to a cloud-based services, that act as an updatable database for data logging and data analysis platform.

Frequency (Hz)	Source of Variation	Types of Sample	Concentration	Interaction
5000	F	50.34939	2.401039	4.196951
	P-value	2.46E-07	0.066949	0.006988
	F-crit	4.259677	2.620654	2.620654
10,700	F	111.0121	3.342453	1.677789
	P-value	1.76E-10	0.01972	0.178307
	F-crit	4.259677	2.620654	2.620654
29,700	F	145.7371	4.828636	1.733965
	P-value	1.1E-11	0.003394	0.165179
	F-crit	4.259677	2.620654	2.620654
48,700	F	156.9803	3.813562	0.791137
	P-value	5.09E-12	0.011033	0.566483
	F-crit	4.259677	2.620654	2.620654
67,700	F	173.0512	5.280391	1.050582
	P-value	1.82E-12	0.00207	0.411575
	F-crit	4.259677	2.620654	2.620654
86,700	F	281.1604	6.420289	3.668565
	P-value	9.37E-15	0.000642	0.013162
	F-crit	4.259677	2.620654	2.620654
100,000	F	153.0785	4.196156	1.504083
	P-value	6.62E-12	0.006994	0.225732
	F-crit	4.259677	2.620654	2.620654

Concentrations (%)	Source of Variation	Types of Sample	Frequency	Interaction
0.1	F	50.24839	265.5703	11.30047
	P-value	1.03E-07	2.44E-23	2.11E-06
	F-crit	4.195972	2.445259	2.445259
0.5	F	11.61783	333.9262	2.045475
	P-value	0.001998	1.04E-24	0.092606
	F-crit	4.195972	2.445259	2.445259
1.0	F	97.43872	663.0638	18.33377
	P-value	1.28E-10	7.86E-29	1.58E-08
	F-crit	4.195972	2.445259	2.445259
5.0	F	168.6605	1185.409	28.1425
	P-value	2.26E-13	2.42E-32	1.25E-10
	F-crit	4.195972	2.445259	2.445259
10.0	F	63.74055	474.0983	12.19819
	P-value	1.08E-08	8.23E-27	1.02E-06
	F-crit	4.195972	2.445259	2.445259
20.0	F	8.575665	317.3233	1.71394
	P-value	0.0067	2.11E-24	0.154609
	F-crit	4.195972	2.445259	2.445259



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