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Electronic Electrolyte Device Diode (EEDD) Made of Electrolyte Resembling Human Blood Plasma

Dr. Mukta Bhatele
Head of the Department,
Department of Computer Science and Engineering,
Jai Narain College of Technology,
Bhopal (M.P.) [India]
E-mail : mukta_bhatele@rediffmail.com

ABSTRACT

The paper presents an experimental study for the realization (development) of an electronic electrolyte device diode (EEDD) from the liquid electrolyte NaCl + KCl + $CaCl_2$ + $NaHCO_3$ + Na_2HPO_4 + H2O resembling constitutionally (chemically) human blood plasma.

The study demonstrates that the original prevailing ion profile of an electrolyte can be modified by applying judicially chosen voltage bias. The human blood electrolyte portion (in and around an organ/part of human body) can be subjected to applied voltage to redistribute ***(in case of sick man)*** *prevailing ion profile and as such contribute towards human disease heeling measures.*

I. INTRODUCTION

An application of a radical non conventional research idea to utilize certain electrolytes as material of the electrical circuit components (resistance R, capacitance C, active device diode, Transistors) is demonstrated. The experimental research study presents realization of an electronic electrolyte device diode (EEDD) made of liquid electrolyte NaCl+ KCl+$CaCl_2$ + $NaHCO_3$ + Na_2HPO_4 + H_2O resembling the constituent materials of human blood plasma. Various samples of electrolyte having different constituent material concentration as depicted below were utilized for the realization of EEDD.

The electrolyte has following concentration levels…

Conc. level	NaCl	KCl	CaCl2	NaHCO3	Na2HPO4	H2O
i	8.14 g. mg	0.321 mg	0.266 mg	2.268 mg	0.077 mg	100 ml
ii	16.28 g. mg	0.642 mg	0.532 mg	2.268 mg	0.154 mg	100 ml
iii	24.42 g. mg	0.963 mg	0.798 mg	4.536 mg	0.231 mg	100 ml
Iv	4.07 g. mg	0.161 mg	0.133 mg	1.134 mg	0.039 mg	100 ml

The constituent compounds cited above were dissolved in 100 ml distilled water and thus the electrolyte solution was prepared. The EEDD was realized from electrolyte samples over elapsed time frame of 0 to 48 hours with time intervals depicted in the various observations (tables, Figures) given below. The EEDD configuration variables (parameter wise) were

(i) Distanced, between the probe two wire terminals.

(ii) The variation of diameters of the probe two wire terminals

(iii) Electrolyte concentration variation

The study speculates realization of useful electronics circuit components (R, C, Diode, Transistor) in the liquid configuration from simple as well as complex electrolytes which may give important inputs to the health parameters of green biomass and human life.

Scientifically this demonstrate that the original prevailing ion profile of an electrolyte can be modified by applying judicially chosen voltage bias (EMF).

In live human body the ion profile in an around every vital organs/portion of it is well defined and spelt out in medical science literature. By creating electrical circuit components (say for example diode or transistor) as well as appropriate electrical circuit like vibrators/ oscillator, amplifier, etc. one can bring back the original normal human body ions profile from the disturbed sick man ions profile.

The human body blood scientifically behaves as a electrolyte and as search if applied to a portion of a flowing blood, the ion profile of the portion of the blood can be modified. This can thus become a powerful process (method) towards the human disease heeling methodology.

1.2 Electrolyte Resistance R and capacitance C

The electrolyte solutions contain positive and negative ions along with electrons (due to oxidation and reduction). These ions under the influence of applied EMF move with different velocities (due to difference in their masses) in opposite directions due to the possession of opposite charges. However the similar charges move uni-directionaly under the influence of EMF. During the process of movement they collide and as such the electrolyte solution as a whole manifests electrical resistance R.

Similarly in depth study of experimental electrolyte visualizes opposite ions location at some distance from each other. From Physics it is known that two distantly placed opposite electrically charged particles depicts capacitance behavior. Thus there is a manifestation of electrical capacitance C by the electrolyte solution.

1.3 The Electrolyte solution electronic device liquid transistor

Theoretically if a third probe C is inserted between A and B one can visualize / realize a liquid transistor device phenomena.

II. THE EXPERIMENTAL STUDY

2.1 Experimental Set up for Stationary Mode:

The electrolyte was put up in a glass beaker (diam = 7cm) and 3 sets of probes (each probe has 2 terminals) were inserted into the electrolyte. Each of the three sets of probes had two wire terminals with diameter ratio A1:B1=1:2, A2:B2=1:2, A3:B3=1:3. Each set was connected to the multi-meter and battery to form a close electrical circuit. The three sets of probes were inserted in the electrolyte beaker with angular separation of 1200. The two terminal wires of the three sets of probes had different separation distance d as under d=2mm, 3mm, 5mm.

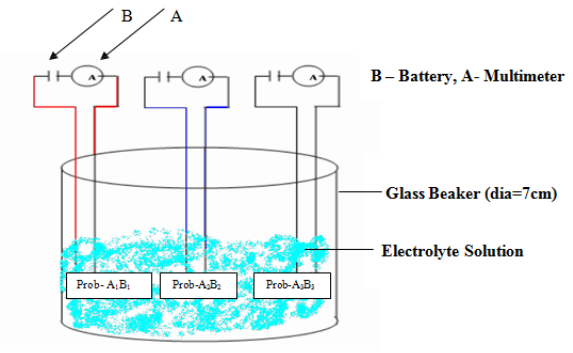

Figure 1 Experimental Set up for stationary mode

2.2 The measurements:

Following diode parameters were measured and calculated in a conventional manner :-

(a) The magnitude of the diode current I_F under forward bias condition (when probe terminals A_1 -, B_1 , A_2, -, B_2, A_3, -, B_3 were simultaneously subjected to +ve applied voltage) and reverse bias current I_R (when probe terminals A_1, B_1, A_2, B_2, A_3, B_3 were simultaneously subjected to -ve applied voltage) where measured.

(b) The vital diode current ratio of I_F/I_R for same opposite applied voltage bias were calculated. The measurements were made under following time frame conditions:

(i) First 5 to 150 minutes after the electrolyte was prepared

(ii) Later on 180 to 300 minutes, 24 hours, 48 hours

Table 1 (A) – Stationary Mode Time first (1 to 160 minutes) I_F, I_R, +/-Volts

Voltage (+/-)	IF & IR		
	2mm	3mm	5mm
-2.50	-1.09	-0.84	-1.34
-2.00	-0.72	-0.49	-0.92
-1.70	-0.17	-0.1	-0.32
-1.50	-0.22	-0.14	-0.34
-1.00	-0.04	-0.02	-0.08
-0.70	-0.02	-0.01	-0.04
-0.50	0.00	0.00	0.00
-0.40	0.00	0.00	0.00
-0.30	0.00	0.00	0.00
-0.20	0.00	0.00	0.00
-0.1	0.00	0.00	0.00
0.1	0.00	0.00	0.00
0.2	0.00	0.00	0.00
0.3	0.00	0.00	0.00
0.4	0.00	0.00	0.00
0.5	0.00	0.00	0.00
0.7	0.01	0.01	0.01
1.0	0.05	0.02	0.07
1.5	0.31	0.12	0.35
1.7	0.31	0.2	0.36
2.0	0.62	0.5	0.69
2.5	0.78	0.55	0.94

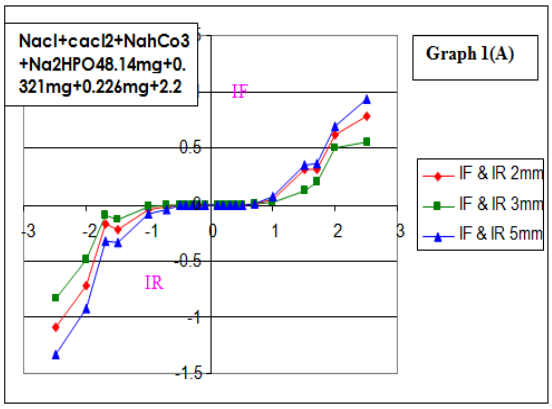

Figure A (1) depict V-I characteristics of EEDD.

2.3 Remarks on the observations

Remark 1: From table 1A and Figure 1B it is cleared that EEDD is not realizable for this concentration(1) Table 2 (A) – Stationary Mode Time after (160 to 240 minutes) I_F, I_R, +/ -Volts.

Table 2 (A) – Stationary Mode Time after (160 to 240 minutes) I_F/I_R, +/-Volts

Voltage (+/-)	Ratio		
	2mm	3mm	5mm
0.2	1.00	1.00	1.00
0.3	0.50	0.50	0.50
0.4	3.00	1.67	3.00
0.5	5.50	5.00	5.50
0.6	5.00	1.60	12.00
0.7	5.33	2.67	9.00
1.0	6.00	1.89	6.83
1.5	3.64	1.25	1.90
1.7	1.28	1.17	1.12
2.0	1.12	1.42	1.00

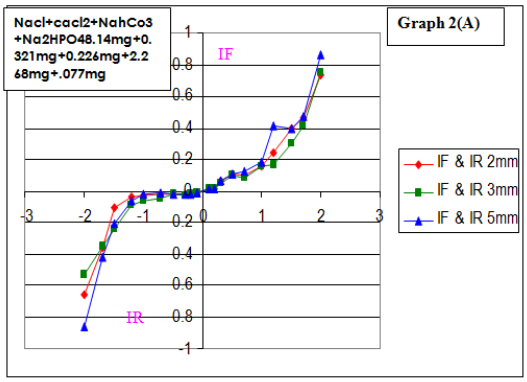

Figure 2 (A) :Stationary Mode Time after (160 to 240 minutes) I_F/I_R, +/-Volts

2.3 Remarks on the observations

Remark 4: From table 4A and Figure 4B it is cleared that EEDD for d=2mm is realizable over applied ±voltage range 0.1 volts to 0.8 volts

3. Experimental Set up for Flow Mode:

An experimental set up (Figure 2) was conceived and realized and electrolyte was filled in the burette and in the capillary tube. Three sets of probes A1B1, A2B2, A3B3 were inserted in the capillary tube as shown in Figure 3. The three separate closed electrical circuits of probes were also established. The burette regulator controlled the flow of blood through the capillary tube. The flow rate was set up first for 60 drops per minute and later on for 15 drops per minutes. The temperature of the blood was controlled around 37$_0$ C. The measurements are depicted in table 5(A), 5(B) and Figures 5(A), 5(B).

NaCl + KCl + CaCl2 + NaHCO3 + Na2HPO4 + H2O

24.42 g. mg/L + 0.963 mg/L + 0.798 mg/L + 6.804 mg/L + 0.231 mg/L 100mL

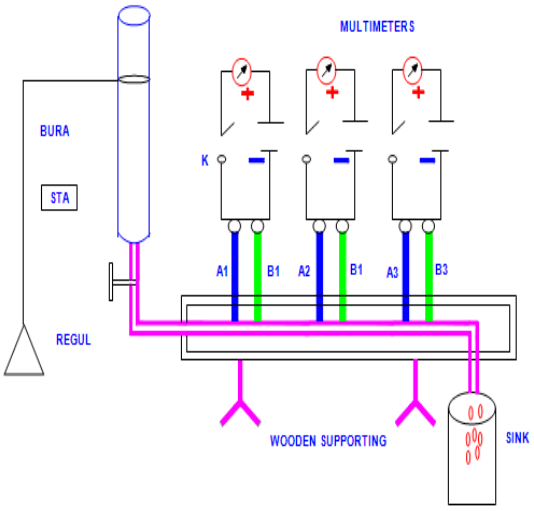

Figure 2: Experimental set up of EHBD

Table 5 (A) – Flow Mode Time after (48 hrs) I_F, I_R, +/-Volts

Voltage (+/-)	IF & IR		
	2mm	3mm	5mm
-1.50	-0.55	-0.45	-0.39
-1.30	-0.24	-0.19	-0.48
-1.20	-0.07	-0.03	-0.04
-1.00	-0.06	-0.04	-0.04
-0.80	-0.05	-0.03	-0.02
-0.70	-0.04	-0.02	-0.02
-0.50	-0.03	-0.03	-0.03
-0.30	-0.01	-0.01	-0.01
-0.20	0	0	0
-0.10	0.00	0.00	0.00
0.1	0.01	0.01	0.01
0.2	0.02	0.02	0.01
0.3	0.03	0.01	0.01
0.5	0.12	0.11	0.05
0.7	0.13	0.02	0.03
0.8	0.16	0.04	0.04
1.0	0.18	0.05	0.06
1.2	0.19	0.11	0.11
1.3	0.25	0.21	0.17
1.5	0.52	0.52	0.34

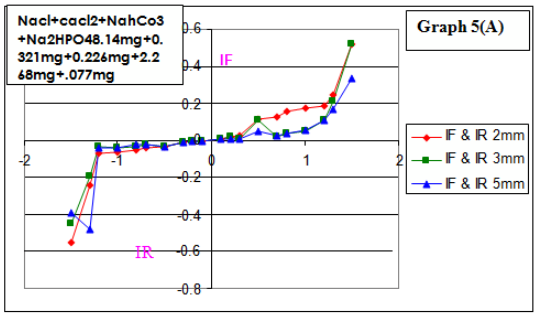

Figure 5 (A) – Flow Mode Time after (48 hrs) I_F, I_R, +/-Volts

Table 5 (B) – Flow Mode Time after (48 hrs) I_F/I_R, +/-Volts

Voltage (+/-)	Ratio		
	2mm	3mm	5mm
0.1	0.00	0.00	0.00
0.2	0.00	0.00	0.00
0.3	3.00	1.00	1.00
0.5	4.00	3.67	1.67
0.7	3.25	1.00	1.50
0.8	3.20	1.33	2.00
1.0	3.00	1.25	1.50
1.2	2.92	3.67	2.75
1.3	1.04	1.11	0.35
1.5	0.95	1.16	0.87

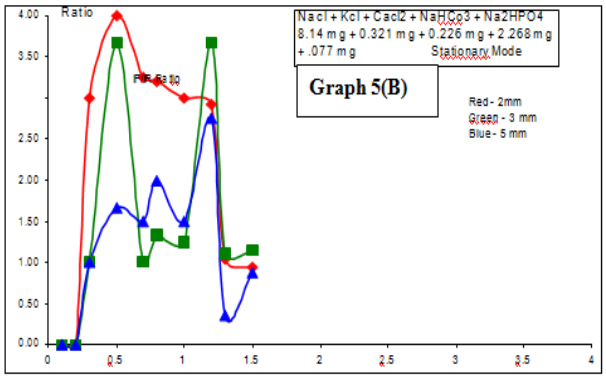

Figure 5 (B) – Flow Mode Time after (48 hrs) IF/IR, +/ -Volts

3.1 Remarks on the observations

From the study of table 5A and Figure 5B it is observed that EEDD is realizable over applied ±voltage range 0.3 to 1.2 volts for d=2mm.

NaCl + KCl + CaCl2 + NaHCO3 + Na2HPO4 + H2O

24.42 g. mg/L + 0.963 mg/L + 0.798 mg/L + 6.804 mg/L + 0.231 mg/L 100mL

Table 6 (A)

Voltage (+/-)	IF & IR		
	2mm	3mm	5mm
2	0.38	0.34	0.37
1.5	0.14	0.13	0.1
1.2	0.03	0.09	0.05
1	0.02	0.60	0.09
0.8	0.002	0.60	0.1
0.5	0.005	0.10	0.00
0.4	0.005	0.00	0.00
0.3	0.00	0.00	0.00
0.1	0.00	0.00	0.00
0	0.00	0.00	0.00
-0.1	-0.06	0.00	0.00
-0.3	0.00	0.00	0.00
-0.4	-0.01	0.00	0.00
-0.5	-0.015	-0.01	0.00
-0.8	-0.05	-0.03	-0.008
-1	-0.06	-0.09	-0.05
-1.2	-0.9	-0.04	-0.08
-1.5	-0.1	-0.16	-0.12
-2	0.28	-0.38	-0.25

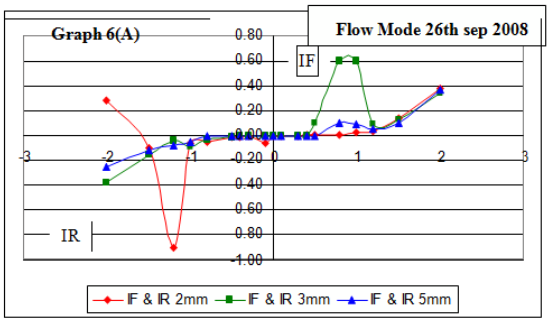

Figure 6 (A)

3.2 EIDD from more concentrated electrolyte solution

Later on experimental study extended to realize EEDD for more concentrated electrolyte solution has given in table 6A and Figure 6B. In this configuration the electrolyte was prepared with three times (by weight) more material dissolved in 100ml. It is found that EEDD is realizable over applied ±voltage range 0.4V to 1.2V.

Table 6 (B)

Voltage +/-	Ratio 2mm	Ratio 3mm	Ratio 5mm
0	0.00	0.00	0.00
0.1	0.00	0.00	0.00
0.3	0.00	0.00	0.00
0.4	-2.00	0.00	0.00
0.5	-3.00	-0.10	0.00
0.8	-2.50	-0.05	-0.08
1	-3.00	-0.15	-0.55
1.2	-3.00	-0.44	-1.60
1.5	-0.71	-1.23	-1.20
2	0.73	-1.11	-0.67

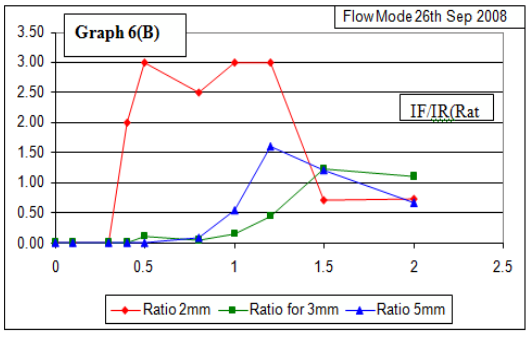

Figure 6 (B)

IV. CONCLUSIONS

1. On the prima facie it is observed that from specific liquid electrolyte EEDD is realizable.
2. To optimize EEDD performance various variables discuss in text can be judiciously chosen.
3. The recorded data has repeatability within 5 To 7% approximately however it was noticed that after an hour or so experimentation the probes are affected by bubbling. During bubbling also EIDD can be realized.
4. Experimental study to realize transistor from this electrolyte is in progress at Charotar Institute of Technology – Changa.
5. The study demonstrates its applicability to human health care (disease heeling) program.
6. The process can be applied for drug testing.

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REFERENCES:

[1] S.P. Kosta, Vimal Patel et al.-2003 "Green Biomass bistable multivibrator" International Journal of Electronics Vol. 90. pp 117-21\

[2] S.P. Kosta, Vimal Patel et al.-2004 (a) "Biomass Active Device a Diode" International Journal of Electronics Vol. 91 No. 10, pp 587-598.

[3] S.P. Kosta, Y.P. Kosta, et al "Green biomass active electronic diode". 2004 (b), International Journal of Electronics Vol.91 No.10,pp 599-610

[4] S.P. Kosta et al.-"Natural soil electronics device diode". International Journal of Electronics volume 93, number 9 September 2006 pp 589-611