Journal of Biotechnology and Bioengineering
Volume 2, Issue 4, 2018, PP 20-24
ISSN 2637-5362

The High-Resolution Electrochemical Measurements for Detecting Effects of MRET Non-Chemical Treatment of Water and the Following Treated Water Effects on Yeasts Saccharomyces Cerevisiae Culture.

Igor Smirnov, Ph.D

Global Quantech SIA, Latvia

***Corresponding Author:** Igor Smirnov, Ph.D, Global Quantech SIA, Latvia, Email:info@gqusa.com*

ABSTRACT

MRET water activator is the stationary source of subtle, low-frequency, resonant electromagnetic field with composite structure. The objective of this article is to demonstrate a non-chemical effect of MRET activation device on molecular structure of water and the following effect of the treated water on yeasts Saccharomyces cerevisiae culture. Hypothetically the introduction of MRET water to biological systems can contribute to the enhancement of the cellular transduction mechanism and the proper function of cells in biological systems. Different EIS patterns around the thermal transition point of activated and non-activated water were detected as a result of experiment. All three samples of activated water demonstrate larger dynamic range before and after the transition point compared to the control samples. Experimental results clearly indicate that incubation of yeast S. cerevisiae in MRET treated sugar solution leads to the enhancement of microorganism's metabolic activity and growth compared to control sample.

Keywords: *MRET activated water, electro-chemical measurement, yeast Saccharomyces cerevisiae.*

OBJECTIVES

MRET Activated Water is produced with the help of Molecular Resonance Effect Technology (MRET). MRET water activator is the stationary source of subtle, low-frequency, resonant electromagnetic field with composite structure (Fig.1). The origin of the low-frequency composite electromagnetic field is the intensive electrical activity inside the nano-circles formed by linear molecular groups of MRET polymer compound (volumetric fractal geometry matrix) when polymeric body is exposed to the external electromagnetic fields of specific frequency and wavelength [Vysotskii, Smirnov 2005]. The objective of this article is to demonstrate a non-chemical effect of MRET activation device on molecular structure of water and the following effect of the treated water on yeasts Saccharomyces cerevisiae culture.

For this purpose MU Electrochemical Impedance Spectroscopy (EIS) device was selected to measure such 'weak emissions' effects. The second part of the experiment was to find effect of MRET treated water based sugar solution on metabolic activity and growth of S. cerevisiae microorganisms. This test was conducted with the help of CYBER Biosensor device. 2

METHODS AND MATERIALS

Experiment was conducted at Research Center of Advanced Robotics and Environmental Science "Cybertronica Research", Germany. Research of last 30 years identified electrochemical measurements of water and aqueous solutions (pH, DC/AC conductivity, impedance spectroscopy) as a useful tool for detecting and characterizing various effects of 'weak emissions' and non-chemical treatment of water. The measuring equipment should satisfy specific requirements such as differential measurements, thermo-stabilization of samples and electronic components, high resolution of the system (up to $10^{-}5$-$10^{-}6$ pH and $10^{-}8$-$10^{-}11$ µS/cm resolution) [Kernbach 2017] .The MU EIS is a compact device for differential Electrochemical Impedance Spectroscopy (EIS) with two and four electrodes measurement (Fig.2). The distinctive feature of this system is its capability for thermal stabilizing the electronic system and samples. This enables accurate differential measurements, where properties of two fluidic or organic samples are compared with each other. Such task appears in

applications, where e.g. weak electrochemical changes should be detected. In four electrode mode, the MU EIS can be also used as a conductivity and potential meter for electrophysiological analysis.

Fig.1

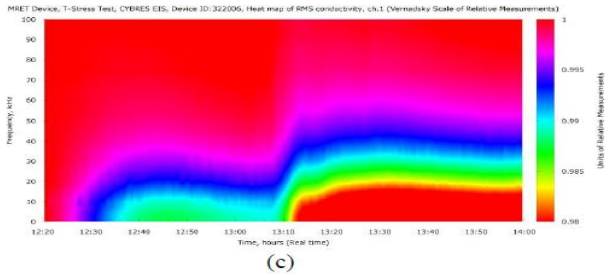
Fig.2

The experimental setup: three experimental containers with distilled water are placed inside MRET device (Fig.1) whereas control containers are stored about 3 meters away in the same laboratory room. Water treatment was started at 10.00am with duration of 30 min.

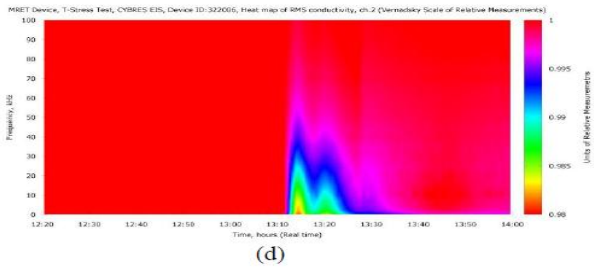
The second part of experiment was the observation of MRET treated water effect on metabolic activity of microbiological culture yeasts Saccharomyces cerevisiae in anaerobic environment. It is the microorganism behind the most common type of fermentation. For this reason experimental strain of S. cerevisiae sample was placed 3 into MRET treated water based sugar solution whereas control sample was kept in non-treated sugar solution. Both samples were kept inside the incubator in anaerobic environment, and at the optimum temperature for growth of S. cerevisiae of 30–35 °C. After 3 hours of incubation all samples of S. cerevisiae were tested for metabolic activity rate with the help of CYBRES Biosensor (device ID: 325005).

RESULTS

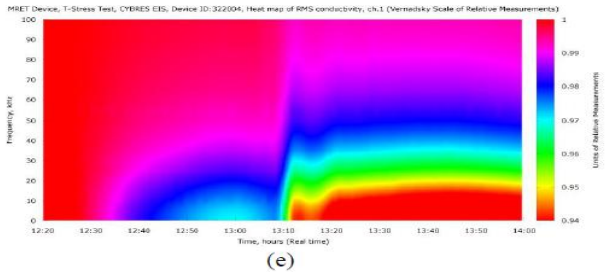
EIS measurements (t-stress test) of the MRET activated water were conducted on 23.10.17 with three independent EIS systems (ID: 322004, 322005, 322006). Different EIS patterns around the thermal transition point of activated and non-activated water are well visible (with equal EIS ranges for control and experimental channels). All three samples of activated water demonstrate larger dynamic range before and after the transition point compared to the control samples (Fig.3).



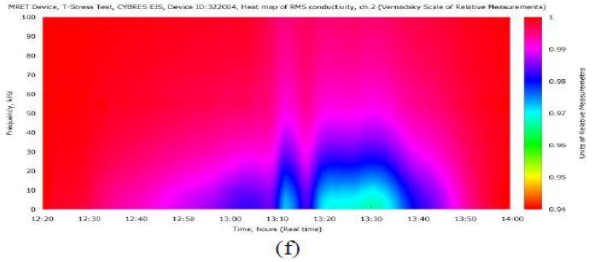
(c)



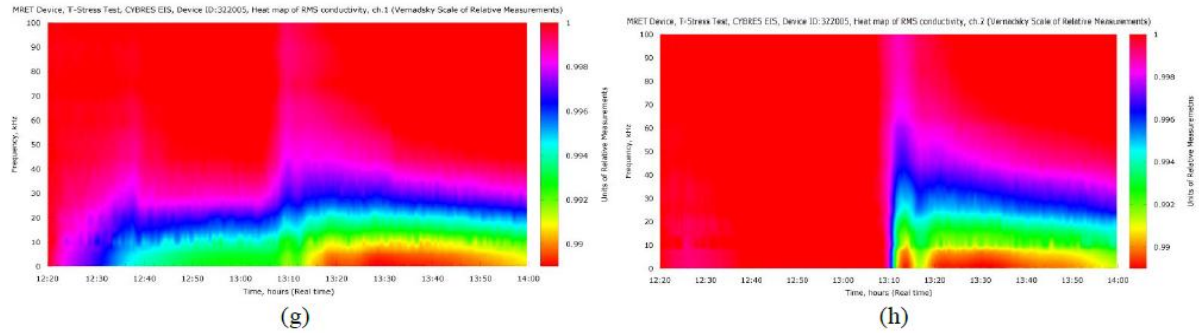
(d)



(e)

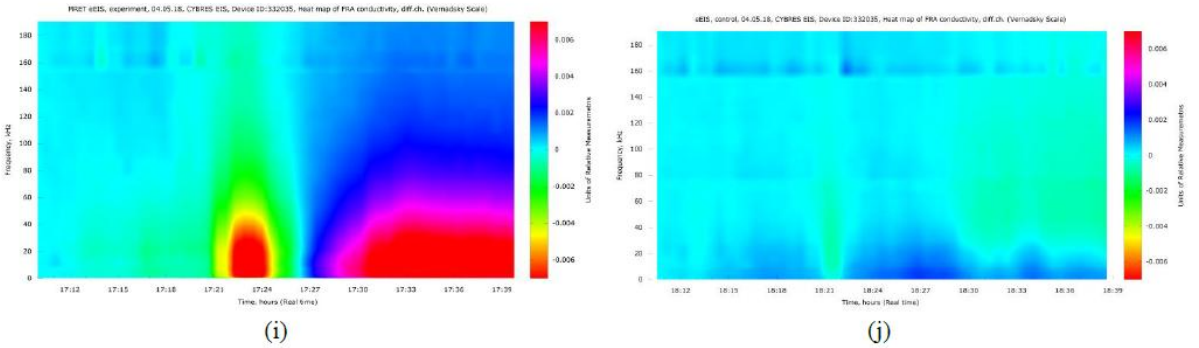


(f)



(g) (h)

Fig. 3 *(c,e,g) EIS data from experimental containers; (d,f,h) EIS data from control containers.*



(i) (j)

Fig.4 *(i) EIS data from experimental container; (j) EIS data from control container.*

These results very well correlate with results of another experiment conducted on 05.04.18 (Fig.4). It proves the repeatability of experiment and MRET device effects on water molecular structure

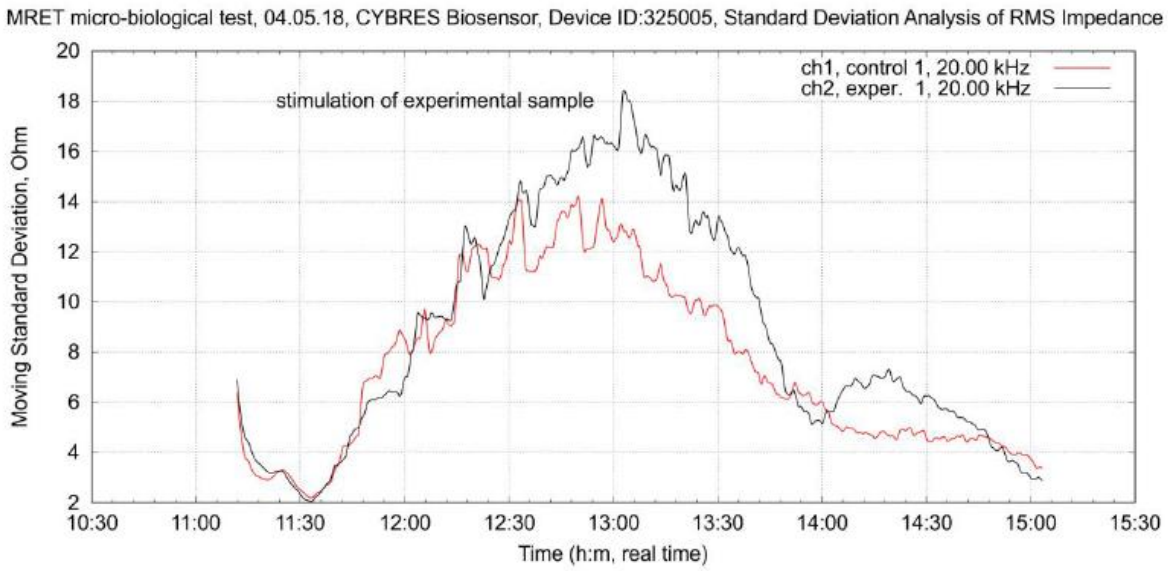


Fig.5 *Metabolic activity of control sample (red color line); metabolic activity of experimental sample (black color line) .*

The metabolic activity of yeast S. cerevisiae samples were tested with CYBRES Biosensor (Fig.5).Results clearly indicate that incubation of yeast S. cerevisiae in MRET treated sugar solution leads to the enhancement of microorganism's metabolic activity and growth compared to control sample.

DISCUSSION

The EIS measures the frequency response of electrical conductivity of an aqueous solution that generally depends on the number of ions and the ionic mobility; the more ions a solution contains, the higher its electrical conductivity. Different parameters of fluids such as the self-ionization constant, hydration, temperature, viscosity, and different processes, related to degasification, ion-ion and ion-dipole interactions, polarization of electrodes, electrochemical reactions with dissolved ions also impact the electrical conductivity. [Kernbach2016].The results allow conclusion regarding the alteration of the molecular formations in MRET activated water considering that MRET activation device is a source of subtle, low frequency oscillations of noise field characteristics. There is scientifically proven evidence that extremely low frequency electromagnetic field can dramatically affect the dielectric permittivity and electrical conductivity of water and water based solutions. Particularly, the scientists of Novo control Technologies GmbH & Co. KG (http://www.novocontrol.com) provide the following results for measurements of electro dynamic characteristics of water when the body of water is exposed to the wide range of electromagnetic oscillations (Fig 6).

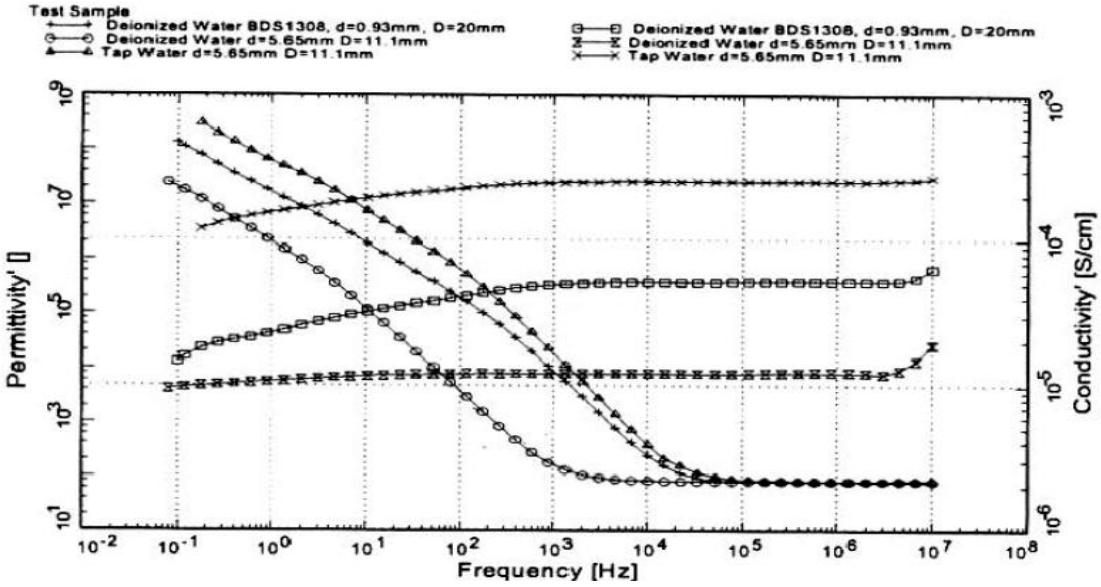


Fig.6 *The relative dielectric permittivity of water significantly increases from 80 up to 108 and electrical conductivity of water samples decreases up to 10 times in the frequency range of 0.1 – 1000 Hz. Measurements were conducted on the samples of deionized and tap water in measurement units with different size (length and diameter) at 20°C.*

These facts confirm that water as a subject to applied EMF of extremely low frequency range undergoes molecular structural modifications. It is reasonable also to admit that these structural changes can affect the electro dynamic characteristics of water in the range of RF frequencies as well [Smirnov 2012]. Taking into consideration that MRET activation device generates a range of extremely low frequencies it is possible to believe that such treatment can affect electrodynamics characteristics of water. The results of EIS testing suggest enhanced ionic activity in MRET treated water and as a result increased potential energy of water molecular system. Particularly it can explain the formation of large molecular clusters in MRET treated water such as polarized-oriented multilayer molecular structuring of water.

CONCLUSIONS

MRET activation device can affect molecular structure of water by enhancing ionic activity that can lead to formation of large molecular clusters in treated water. It was found that MRET treated water has significant enhancing effect on metabolic activity of yeasts Saccharomyces cerevisia. S.cerevisia microorganism plays major role in all

fermentation process in digestive systems of humans and animals as a part of microbial associations (similar to microbial associations in the intestine). 7

REFERENCE

[1] Kernbach,S., (2017), High-resolution electrochemical measurements for detecting effects of non-chemical treatment of water, abstract, Conference on physics, chemistry and biology of water Sofia, Bulgaria, October 28, 2017

[2] Kernbach, S., Kernbach, O., (2016)," Reliable detection of weak emissions by the EIS approach", International Journal of Unconventional Science, issue E1, pp.90-103.

[3] Smirnov.I, (2012), "The Effect of MRET Noise Field Generator on SAR Values of RF Phones", ARPN Journal of Science and Technology, VOL. 2, NO. 9, pp. 878-885.

[4] Vysotskii, V.I., Smirnov, I.V. and Kornilova, A.A. (2005) "Introduction to the Biophysics of Activated Water," Universal Publishers, USA

Citation: *Igor Smirnov, Ph.D "The High-Resolution Electrochemical Measurements for Detecting Effects of MRET Non-Chemical Treatment of Water and the Following Treated Water Effects on Yeasts Saccharomyces Cerevisiae Culture."Journal of Biotechnology and Bioengineering, 2(4), pp 20-24*