

DEVELOPMENT OF A NEW FOOD PRESERVATION AND PACKAGING TECHNIQUE FOR LIQUID FOOD PRODUCTS BY USING PYRAMID SHAPE POWER

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ABSTRACT

There is a high demand for packaged, preserved food worldwide especially nowadays due to the rapid growth of the world population to store food for long periods of time, to use off-season and to export to different areas of the world undergoing shortages. Most current preservation techniques cause a reduction in quality and a loss of vitamins and nutrients, therefore a top priority in food sciences has been the elucidation of alternative, less stringent techniques. The Pyramid shape technique combines preservation and packaging in one process and is poised to be a useful tool to the food industry. The Pyramid shape technique creates a unique opportunity for both food manufacturers and consumers to package, preserve and produce a new kind of structured water that has many beneficial effects for human health. The new technique, based on the mystery of the dimensional ratio of the Great Pyramid of Giza in Egypt, it is the only responsible factor for the water molecular structure alteration and the preservation effect without any other physical or chemical treatment. The effects of pyramidal and square packaging shapes on mineral water were studied by examining ice surface morphology. Ice surface morphology was examined by variable pressure scanning electron microscopy VP-SEM. The pyramid shaped container promotes the formation of filament shaped water and mineral particles. These results provide evidence that a pyramidal container acts to structure water in an ordered manner.

Keywords: *Pyramid, preservation, packaging, microorganisms, water*

INTRODUCTION

Current food borne microbial outbreaks and the demand to minimize chemical additives in food require a lot of research in order to find innovative ways to preserve foods while maintaining freshness, quality, nutritional content and safety. New techniques such as high pressure, antimicrobial packaging, irradiation and modified atmosphere are being developed. Pyramid shape packaging is another option which provides increased food safety and quality, a technology that can be combined with hurdles technology [1]. Pyramid shape technique is a development of packaging and containers made of dielectric materials such as plastic, fiber glass and paper molded into the form of a pyramid using the dimensional ratio as the measurements of the great pyramid in Egypt [5]. The great pyramid (Khufu Pyramid) is a square pyramid which is a structure with a square base and four triangular outer surface sides meeting in an apex with a slope angle about 52 degree. The main purpose of the great pyramid construction was to serve as a tomb for the Egyptian Pharaoh Khufu in 2560 BC [3], but the actual construction of the great pyramid remains a mystery. Many theories exist which discuss the unique measurements, the purpose and the construction technique of the great pyramid [4]. By using the shape of the great pyramid in food packaging, we hope to combine both preservation and packaging in one process based on the altered shape of water molecules and anti-microbial properties. It has been previously mentioned that the power that generates inside, above or under the pyramid shape is the responsible factor for the preservative effect without any other chemical or physical treatment [5]. This power historically refers to unusual, paranormal and supernatural properties of the great pyramid in Egypt and similarly shaped objects.

Current preservation techniques have many disadvantages. For example, a considerable loss of some nutrients occurs during the drying method. In particular, vitamin C is destroyed during blanching of vegetables. Rehydration poses additional problems as loss of thiamin, riboflavin and niacin has been documented [6]. Heat-

sensitive vitamins such as vitamin C are also destroyed by Ultra high temperature treatment (UHT) which involves rapid heating and cooling of food to about 140°C for a few seconds in order to kill microbes [7]. Nowadays, chemical preservatives such as nitrites and sulphites can both cause asthma, nausea, vomiting and headaches. In addition, there is increasing pressure to avoid salt to the negative long term effects on health. For example, salt is known to increase blood pressure [8]. Irradiation of dairy products that have sulphur-containing amino acids result in unpleasant off-flavours due to breakdown of amino acids. Irradiation is also responsible for the softening of vegetables and fruits due to the breakdown of high-molecular-weight carbohydrates into smaller units represented by the breakdown of cell wall materials. Some vitamins, such as vitamin B1 and vitamin C are also partially lost. In addition, there are undesired changes that occur in organoleptic characteristics [9]. It is commonly known that smoked foods contain carcinogenic polycyclic aromatic hydrocarbons (PAHs), so, gastrointestinal cancer is likely to be increased by consuming smoked foods [10]. In addition to negative nutritional benefits, current preservative techniques can have substantial costs to the business. For example, there are some costs associated with freezing method including initial cost of freezer, fuel, water used in preparing food, electricity, repair maintenance, packaging materials and the ingredients such as anti-darkening agents [11].

Unlike most of the current preservation and packaging techniques, pyramid packaging has no cost in the preservation process. In addition, the process is as simple as designing the proper dimensions in the packaging materials. Pyramidal package is a multi-use liquid package. The pyramid shape power source is free and inexhaustible. It can be used anywhere as a mobile preservation package because it does not combine any complex operations or extra equipment. It is capable of reducing the cost of preserving and storing food, and furthermore, it will overcome the disadvantages of current preservation methods. Because of the various costs and effectiveness of current preservation and packaging methods, alternative techniques are a top priority for food scientists. The main objective of this research is to develop food preservation and packaging techniques for liquid food products. The specific objective is to determine the effect of Pyramidal containers on water crystal structure.

In recent decades, there has been increased interest in the proposed enhanced energy fields created by the great pyramids. In 1930 a French man called Antoine Bovis suggested that the shape of the pyramid influences the mummification of organic material [12, 20]. There is a lawsuit regarding the origin of the term "Pyramid Power", between Max Toth and Patric Flanagan regarding the intellectual property of who coined the term "Pyramid power" [13, 14]. However, the word first appeared in Sheila Ostrander and Lynn Schroeder's book entitled "Psychic Discoveries behind the Iron Curtain" in 1970. They mentioned that in 1960s a Czechoslovakian researcher coined the term [15]. A patent was published in 1959 entitled "Method for maintaining razor blades and the shape of straight razors" in which blades was placed under a hollow pyramid made of dielectric material and aligned to earth north-south magnetic field [16]. Another patent was published regarding regulation of human body energy using a pyramid made of dielectric material and with the dimensions of Cheops pyramid [17]. The pyramid Energy model has also been used in the medical field to treat infectious diseases and allergies [18, 19]. Recently it has also been shown that the pyramid structure can alter the pH of the solution contained within the pyramid. Similar to the positive effects on the role of the pyramid in mummification, the pyramid shape has also been shown to promote moisture loss of internal biological samples, along with a threefold increase in the decomposition ratio of aqueous hydrogen peroxide (H₂O₂) [21]. When pyramid-contained water was evaluated in medical devices, it was shown that frozen water formed filamentous structures [23]. The pyramid shape can actually impart a magnetic field as demonstrated by fluxgate magnetometer measurements of fiber glass versions of the great pyramid. These experiments show that the structure generated 310 Gamma with an accuracy of +/- 20. [24]. The ability of the pyramid to induce a low-frequency field is significant because low frequency magnetism has been shown to decrease the colony forming units of *Escherichia coli*, *Leclercia adecarboxylata* and *Staphylococcus aureus* bacteria [27]. It has also been observed that growth curves of *Escherichia coli* are reduced when subjected to magnetism [28]. A recent study revealed that the hollow Pyramidal structures inhibited the growth of Staphylococci bacteria in milk samples that were kept inside them compared to control as appeared in Figure FIG 2.

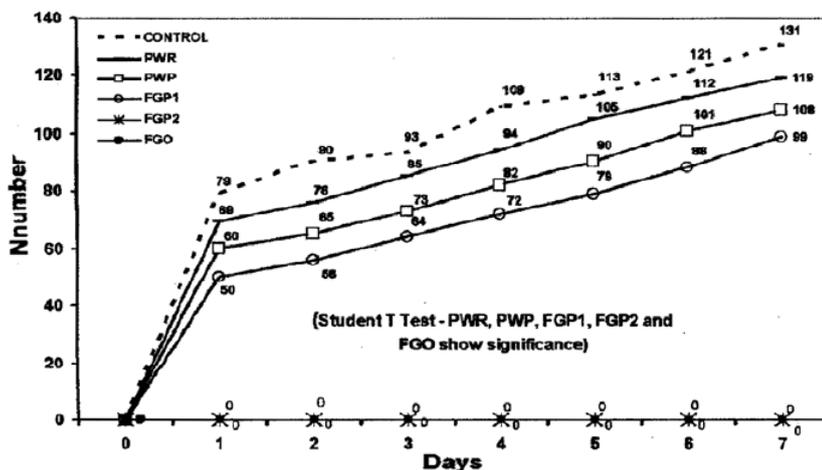


FIG 2. Growth of Microorganism - Staphylococci

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The bacteriostatic effect induced by magnetism likely arises from the primary effect of magnetism on water organization. Recent studies have demonstrated a correlation between electromagnetic fields and changes in water behavior [35-39]. For example, water exhibits changes in physicochemical properties in response to variations of magnetic field intensity and/or frequency [38-40]. Magnetic water treatment plays an increasingly important role among chemical water conditioning methods regarding improving the dispersion separations and controlling the scale [41]. Lundager Madsen has concluded that the crystallization of sparingly soluble diamagnetic salts of weak acids such as phosphates and carbonates was accelerated by a magnetic field. He suggested that magnetic field disturbs dehydration by hindering the transfer of the proton to a water molecule, thus it is able to change the orientation of the proton spin [42, 43]. The magnetic fields caused detectable changes in water and have been investigated in an attempt to determine the structure of liquid water [44]. A study has been conducted on the effect of pyramid-treated water on two groups of mice infected by cancer, the swellings was shown to decrease by 50% in the group where pyramid-treated water has been given compared to the control group where a normal water has been given. Also pyramid-treated distilled water increased the indexes of a new borns when orally administered to be normal as opposed in the control when glucose solution was administered intravenously [22].

MATERIALS AND METHODS

Container manufacturing

An injection molding machine was used to manufacture four containers made of Plexiglas; two pyramidal containers with a slope angle of about 52 degrees a height of 100 mm and square base length 157 mm. The same dimensions as the Cheops pyramid in Egypt. The volume of the pyramidal containers can be found by the formula $\text{volume} = \frac{1}{3}bh$ where b is the area of the base and h the height from the base to the apex. Two rectangular prism containers with nearly the same volume as the pyramidal containers were also generated. The volume of a rectangular prism container can be found by the formula: $\text{volume} = lwh$ where l is the length, w the width and h the height of the container.

Experimental area preparation

The four containers were kept in a single room where the distance between each container and between the walls was 2 meters. All containers were placed on four surfaces identical in shape, size and height. Two sides of the square base of the four containers were oriented in the magnetic North-South direction using a compass.

Sample preparation and variables determination

The experiment was conducted with mineral bottled water which was placed inside a pyramidal container; this mineral water contains some minerals such as potassium, sodium, magnesium, bicarbonate, chloride and sulphate. 5mL of water sample was collected to determine the alteration of the water structure by examining the ice structure before and after. The ice structure was examined by variable pressure scanning electron microscope VP-SEM at microscopy unit - institute of bioscience - University Putra Malaysia to determine the effect of container shape on the ice surface structure. After 24, hours 5mL of water samples were collected from each container. The examination was done by placing ~ 0.30mL of the sample inside the VP-SEM specimen holder. The water started to freeze when the temperature of the experiment was set to -12 °C. Once the pressure of 100 pa was reached the (VP-SEM) examination stage monitored at low magnification (~100x), then the examination of the surface morphological changes started.

RESULTS AND DISCUSSIONS

Based on the previous literature, pyramid shapes can induce a magnetic field [24]. In addition it has been shown that magnetic fields can alter the water molecular structure and the crystallization mode [35-44]. Fig.1. (a) Shows the mineral particles' distribution in the water sample which was kept inside a pyramidal container made of Plexiglas for 24 hours at -12 °C. it also shows that the ice surface has morphological changes ; it is filament-shaped and is surrounded by minerals which also adopt a filamentous shape. Fig.1. (b) Shows the mineral particle distribution in the water sample that has been kept inside a square shape container made of Plexiglas. The ice surface has different morphological changes and neither the water nor the minerals form filamentous particles. These results are in agreement with that of the literature [23] in which the effect of pyramid shape can be observed as filament-shaped structures in frozen water. These results provide evidence that the pyramid packaging shape has an effect on mineral water kept inside them. The packaging of water in pyramid shapes provides great potential for beneficial packaging systems which can improve human health and relieve disease.

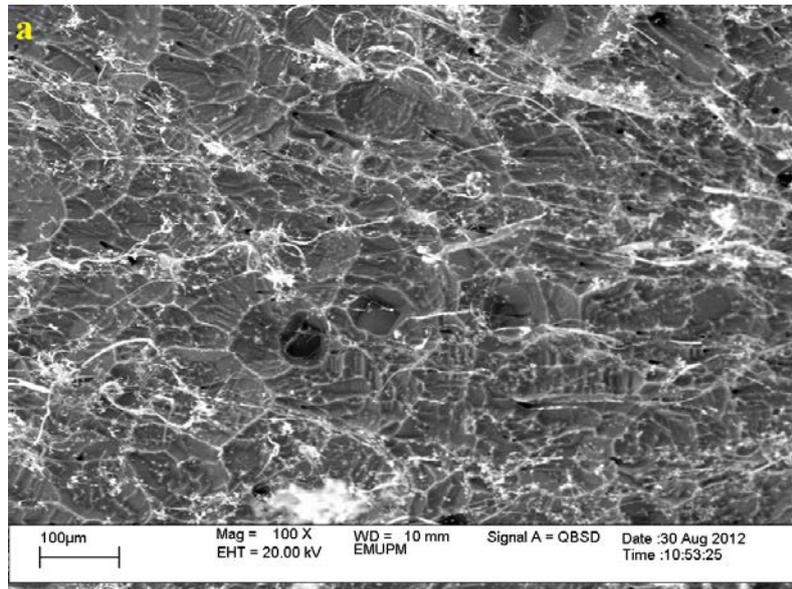


Fig.1. (a):VP-SEM micrographs of commercial natural mineral water samples at -12 degree Celsius and 100 Pa that placed inside pyramid shape container made of Plexiglas for 24 hours

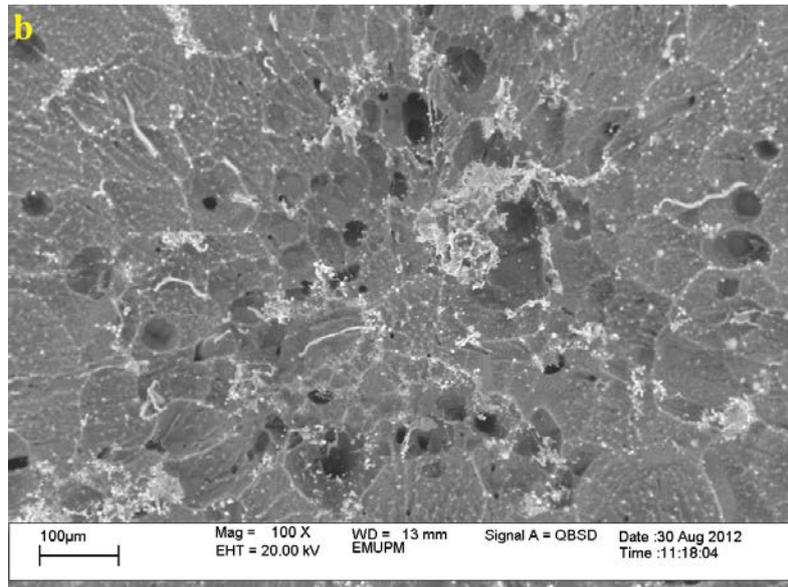


Fig.1. (b):VP-SEM micrographs of commercial natural mineral water samples at -12 degree Celsius and 100 Pa that placed inside a square shape container made of Plexiglas for 24 hours

CONCLUSIONS

The VP-SEM examination of ice is an effective means to reflect ice morphological changes. According to the changes of the ice surface morphology, the effect of packaging shape on water or aqueous solutions can be studied. Up to now, it has been difficult to establish a relationship between the effects of packaging shape on the molecular structure changes of water; further research is needed to determine quantitative methods of analysis. It is not enough to rely on VP-SEM to deduce ice surface morphology. It is necessary to do study the relationship between the effect of packaging shape and water molecular structure by combining VP-SEM and other approaches in the future to explain the reasons that make pyramid-treated water has beneficial effects on human health.

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REFERENCES

- [1] P. Suppakul, J. Miltz, K. Sonneveld, S.W. BiggerActive packaging technologies with an emphasis on antimicrobial packaging and its applications *Journal of Food Science*, 68 (2003), pp. 408–420
- [2] Viegas, J., Pyramids packed with fossil shells, ABC News in Science, www.abc.net.au/science/articles/2008/04/28/2229383.htm
- [3] Shaw, Ian (2003). *The Oxford History of Ancient Egypt*. Oxford University Press. ISBN 0-19-815034-2. Shaw (2003) p.89.
- [4] Shaw, I. (2011) Building the Great Pyramid. *BBC*.
- [5] Abdelsamie, Maher A. A. (2012). EG Patent Application No. 2012050945. Cairo, Egyptian Patent Office.
- [6] P. Kendall, P. DiPersio and, J. Sofos (2012): Drying Vegetables – Fact Sheet No. 9.308- From: Online Database of Colorado State University Extension - EXT.COLOSTATE www.ext.colostate.edu, Date of access 20/06/2012
- [7] Australian Academy of Science. (2012).When bugs have you on the run. In Box 2 - Food preservation. Retrieved 20/06/2012, from <http://www.science.org.au>.
- [8] Australian Academy of Science. (2012).When bugs have you on the run. In Box 2 - Food preservation. Retrieved 20/06/2012, from <http://www.science.org.au>

- [9] Kilcast, D., Food irradiation: Current problems and future potential, *International Biodeterioration & Biodegradation*, Volume 36, Issues 3–4, October–December 1995, Pages 279-296, ISSN 0964-8305, 10.1016/0964-8305(95)00071-2.
- [10] Fritz W, Soós K., Smoked food and cancer, *Bibl Nutr Dieta*. 1980;(29):57-64. PMID: 7447916.
- [11] P. Kendall, P. DiPersio and, J. Sofos (2012): Drying Vegetables – Fact Sheet No. 9.308- From: Online Database of Colorado State University Extension - EXT.COLOSTATE www.ext.colostate.edu, Date of access 20/06/2012.
- [12] Bovis, Antoine. "Excerpt from Exposé de M.A. Bovis au Congrès International de Radiotellerie à Nice". (Nice: Bovis, c. 1935). Translation by Jean-Paul Buquet. *Skeptic.com*. Retrieved June 30, 2012.
- [13] Loxton, Daniel. "A Conversation with Max Toth." *Skeptic.com*. http://www.skeptic.com/junior_skeptic/issue23/interview_Toht.html (accessed July 1, 2012)
- [14] Flanagan, Patrick. *Pyramid Power* (Santa Monica: Pyramid Power – V, Inc, 1975).
- [15] Ostrander, Sheila, and Lynn Schroeder. *Psychic Discoveries Behind the Iron Curtain*. (New Jersey: Prentice-Hall, 1970). 339-348.
- [16] Drbal, Karel. "*Patenti Spis c. 91304*. (Prague: 1959)". English translation hosted at www.amasci.com. Retrieved June 2012.
- [17] Otto, Kausch (1987). German *Patent No.* 3525521. German patent office. Translation by <http://worldwide.espacenet.com>. Retrieved June 30, 2012.
- [18] Armin, C Bauer (1998). German *Patent No.* 19717053. German patent office. Translation by <http://worldwide.espacenet.com>. Retrieved June 30, 2012.
- [19] Hideji, Kasai (1997). Japanese *Patent No.* 9313624. Japanese patent office. Translation by <http://worldwide.espacenet.com>. Retrieved June 30, 2012.
- [20] Laigaard, Jens. "excerpt from Chapter Eight of *Pyramideenergien – kritisk undersøgelse* (1999)." Translated by Daniel Loxton and Jens Laigaard. *Skeptic.com*. http://www.skeptic.com/junior_skeptic/issue23/translation_Laigaard.html (accessed June 28, 2012).
- [21] Narimanov AA. [Pyramid effect]. *Biofizika*. 2001 Sep-Oct;46(5):951-7. Russian. PubMed PMID: 11605404
- [22] DeSalvo, J. *The Complete Pyramid sourcebook*. 1st Book Library, 2003. Page 137,138
- [23] Alekseev, Perepelkin I. (2002). Russian *Patent No.* 2184574. Russian patent office. Translation by <http://worldwide.espacenet.com>. Retrieved June 30, 2012
- [24] Davidson, D. (1997). *Shape power: the fundamental discovery of how shape modifies undifferentiated universal aether into electricity, magnetism, and nuclear forces*. Sierra Vista, AZ: RIVAS Pub
- [25] DeSalvo, J. *The Complete Pyramid sourcebook*. 1st Book Library, 2003. 146.
- [26] Beglarian R. A., *Brief communications and abstracts of posters of the XXIII International Dairy Congress, Montréal, October 8-12, 1990*. Ottawa: The Congress = Le Congrès, 1990. Print.
- [27] Lukáš Fojt, Luděk Strašák, Vladimír Vetterl, Jan Šmarda, Comparison of the low-frequency magnetic field effects on bacteria *Escherichia coli*, *Leclercia adecarboxylata* and *Staphylococcus aureus*, *Bioelectrochemistry*, Volume 63, Issues 1–2, June 2004, Pages 337-341, ISSN 1567-5394, 10.1016/j.bioelechem.2003.11.010.
- [28] Ludek Strašák, Vladimír Vetterl, Jan Šmarda, Effects of low-frequency magnetic fields on bacteria *Escherichia coli*, *Bioelectrochemistry*, Volume 55, Issues 1–2, January 2002, Pages 161-164, ISSN 1567-5394, 10.1016/S1567-5394(01)00152-9.
- [29] kumar I. R., Swamy NVC & Nagendra HR, Effect of pyramids on micro-Organism, *Indian J Traditional Knowledge*, 4 (4) (2005) 373–379.
- [30] Gopinath R K, Prem Anand Nagaraja & Nagendra H R, The effect of pyramids on preservation of milk, *Indian J Traditional Knowledge*, 7 (2) (2008) 233-236
- [31] Hook J.R., *Solid State Physics* (2nd Edition), H.E. Hall, Manchester Physics Series, John Wiley & Sons, 2010, ISBN 978-0-471-92804-1.
- [32] Alekseev, Perepelkin I. (2002). Russian *Patent No.* 2184574. Russian patent office. Translation by <http://worldwide.espacenet.com>. Retrieved June 30, 2012
- [33] DeSalvo, J. *The Complete Pyramid sourcebook*. 1st Book Library, 2003. 137.
- [34] DeSalvo, J. *The Complete Pyramid sourcebook*. 1st Book Library, 2003.138.
- [35] J. M. D. Coey and S. Cass, *J. Magn. Mater.* **209**, 71-74 (2000).
- [36] K. W. Busch and M. A. Busch, *Desalination* **109**, 131-148 (1997).
- [37] C. Gabrielli, R. Jaouhari, G. Maurin, and M. Keddou, *Water Res.* **35**, 3249-3259 (2001).
- [38] S. Ozeki, C. Wakai, and S. Ono, *J. Phys. Chem.* **95**, 10557-10559 (1991).
- [39] J. Oshitani, R. Uehara, and K. Higashitani, *J. Colloid Interface Sci.* **209**, 374-379 (1999).
- [40] Kobe, S.G. Drazic, P.J. McGuinness, J. Strazisar, The influence of the magnetic field on the crystallization form of calcium carbonate and the testing of a magnetic water-treatment device, *Journal of Magnetism and Magnetic Materials*, 236:71–76, 2001.

- [41] Lipus, L., Krope, J., and L. Crepinsek, Dispersion Destabilization in_Magnetic Water Treatment, Journal of Colloid and Interface Science, 236, PP: 60–66, 2001.
- [42] Madsen, L. H.E., Influence of magnetic field on the precipitation of some inorganic salts. J. Cryst. Growth 152, 94–100, 1995.
- [43] Madsen, L., H.E., Crystallization of calcium carbonate in magnetic field ordinary and heavy water. J. Cryst. Growth 267, 251–255, 2004.
- [44] Kronenberg, K.; , "Experimental evidence for effects of magnetic fields on moving water," *Magnetics, IEEE Transactions on* , vol.21, no.5, pp. 2059- 2061, Sep 1985.