



DENBA Products



DENBA Co.,Ltd

Company Information



DENBA Co.,Ltd.

Company profile

Company name: DENBA Co.,Ltd.
President: Kanetaka Goto
Address: 5F Meitetsu Fudosan building
Nishikicho Kanda Chiyoda-ku Tokyo Japan

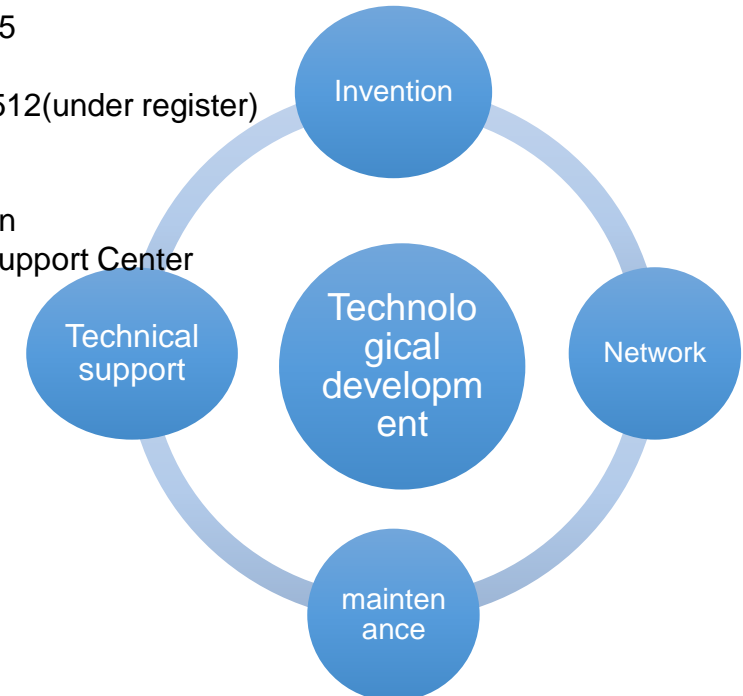
tel +81 3 3518 6718
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Business detail:
Electro potential generation device
DENBA+
DENBA S
DENBA Fryer
Industrial Kitchen equipment
Industrial Ice maker
Water supply and drainage equipment

Patent for
Electro potential generation device
Japan Number 5683032
Japan Number 5974377
China Number 1924981
Taiwan Number 1568395
USA Number 9681677
Korea Number 10-2015-7011855

Internal patent PCT/JP2014/80512(under register)

PSE mark in Japan
Supported by Tokyo Metropolitan
Small and Medium Enterprise Support Center



History

2004年4月	Foundation of AGUA Shoji KK	2016年5月	Started rental business of DENBA series
2013年3月	Start fresh-keeping technology research	2016年9日	Spatial potential generator Acquisition of Japanese Patent No. 5974377
2013年8月	Freshness device "DENBA +" commercialized	2017月2日	Freshness holding device utilizing space potential Taiwan Patent Acquisition No. 1568395
2014年4月	Commercialization of "DENBA FRYER"		
2015年1月	Tokyo office moved to Kanda Nishiki-cho in Chiyoda-ku	2017月8日	Freshness holding device utilizing space potential Acquisition of U.S. Patent No. 9681677
2015年4月	Freshness device utilizing space electro potential Japanese Patent Acquisition No. 5683032		
2015年5月	Floor expansion of Tokyo office	2017月7日	Freshness holding device utilizing space potential Korean Patent Acquisition No. 10-1759099
2016年1月	Establish factory in Toda-shi, Saitama Tokyo Metropolitan Business Promotion Corporation Support Assistance of 「DENBA +」		
2016年2月	Spatial potential generator Chinese Patent Acquisition No. 1924981	017年9月	Shanghai branch office established
2016年3月	DENBA commercial freezer/refrigerator started to sell. 「DENBA S」 also started to sell.	2017年10月	Company name change to DENBA Co.,Ltd.
		2017年11月	Launched household refrigerator equipped with DENBA by China Hefei Meiling Co., Ltd.



Agencies and overseas branch office list

代理店

株式会社イシダ

オザックス株式会社

加賀電子株式会社

タニコー株式会社

株式会社寺岡精工

デイブレイク株式会社

日本エウレカ株式会社

株式会社マルゼン

AZES JAPAN株式会社

CBC株式会社

海外支社

鲜霸保鲜（上海）科技有限公司

鲜立达保鲜科技(苏州)有限公司

北京优储良品科技有限公司

北京电霸鲜商贸有限公司

广西电霸保鲜王冷链科技有限公司

广东电霸保鲜王冷链科技有限公司

广州成云电霸保鲜科技有限公司

宁波供销鲜霸科技有限公司

云南昆明电霸保鲜科技有限公司

台湾电霸冷链物流有限公司



DENBA Branches · Showrooms



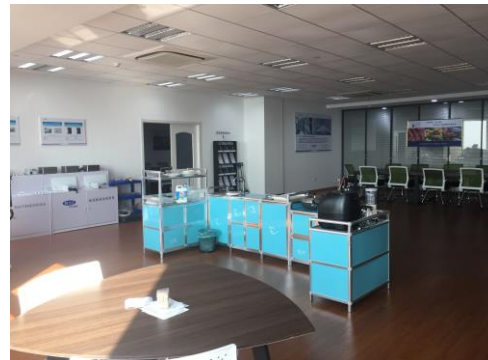
Japan Show Room



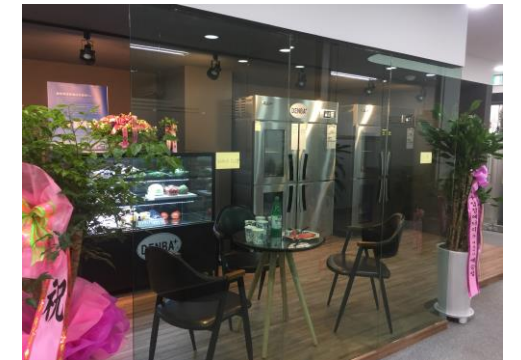
Shanghai Branch



Suzhou branch office in China



Korean Seoul Showroom



Patent status list

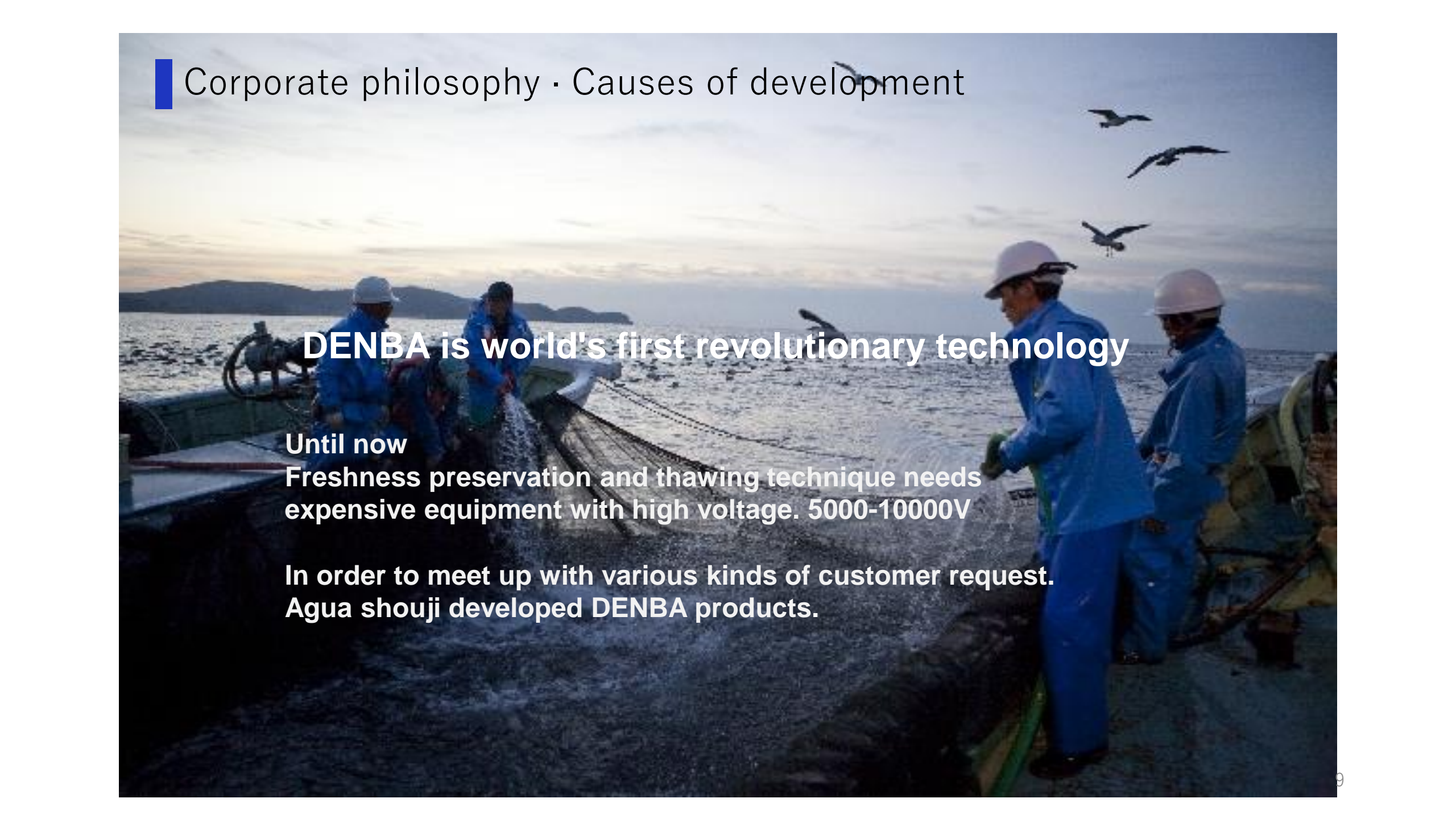
特許番号、特許出願番号	特許名称	申請国	法律状態（受理/申請）	出願人
第5974377号	空間電位発生装置を利用した鮮度保持装置	日本	権利化	後藤錦隆
第5683032号	空間電位発生装置、空間電位発生装置を利用した鮮度保持装置及び空間繊維発生装置を備えたフライヤー	日本	権利化	後藤錦隆
第1924981号	空間電位発生装置	中国	権利化	後藤錦隆
第10-2015-7011855号	空間電位発生装置、空間電位発生装置を利用した鮮度保持装置及び空間繊維発生装置を備えたフライヤー	韓国	権利化	後藤錦隆
第15683594号	空間電位発生装置、空間電位発生装置を利用した鮮度保持装置及び空間繊維発生装置を備えたフライヤー	台湾	権利化	後藤錦隆
第9681677号	空間電位発生装置を利用した鮮度保持装置	USA	権利化	後藤錦隆
第11201606465P号	空間電位発生装置、空間電位発生装置を利用した鮮度保持装置及び空間繊維発生装置を備えたフライヤー	Singapore	申請中	後藤錦隆
第PI2016702673号	空間電位発生装置、空間電位発生装置を利用した鮮度保持装置及び空間繊維発生装置を備えたフライヤー	Malaysia	申請中	後藤錦隆
第I-2016-501408号	空間電位発生装置、空間電位発生装置を利用した鮮度保持装置及び空間繊維発生装置を備えたフライヤー	Philippines	申請中	後藤錦隆
第I-2016-03024号	空間電位発生装置、空間電位発生装置を利用した鮮度保持装置及び空間繊維発生装置を備えたフライヤー	Vietnam	申請中	後藤錦隆
第P-00201605054号	空間電位発生装置、空間電位発生装置を利用した鮮度保持装置及び空間繊維発生装置を備えたフライヤー	Indonesia	申請中	後藤錦隆
第I601004679号	空間電位発生装置、空間電位発生装置を利用した鮮度保持装置及び空間繊維発生装置を備えたフライヤー	Thailand	申請中	後藤錦隆

第BR112016017484-4号	空間電位発生装置、空間電位発生装置を利用した鮮度保持装置及び空間繊維発生装置を備えたフライヤー	Brazil	申請中	後藤錦隆
第2939177号	空間電位発生装置、空間電位発生装置を利用した鮮度保持装置及び空間繊維発生装置を備えたフライヤー	Canada	申請中	後藤錦隆
第721355号	空間電位発生装置、空間電位発生装置を利用した鮮度保持装置及び空間繊維発生装置を備えたフライヤー	New Zealand	申請中	後藤錦隆
第201637027650号	空間電位発生装置、空間電位発生装置を利用した鮮度保持装置及び空間繊維発生装置を備えたフライヤー	India	申請中	後藤錦隆
第14.882328.9号	空間電位発生装置、空間電位発生装置を利用した鮮度保持装置及び空間繊維発生装置を備えたフライヤー	EU	申請中	後藤錦隆
第MX/a/2016/010658号	空間電位発生装置、空間電位発生装置を利用した鮮度保持装置及び空間繊維発生装置を備えたフライヤー	Mexico	申請中	後藤錦隆
第CN201610003901.5号	一般家畜肉冷凍と解凍方法	中国	申請中	中国農業科学院、後藤錦隆
第CN201610003902.X号	豚肉の静電場による鮮度保持方法	中国	申請中	中国農業科学院、後藤錦隆
第10-2017-7019287号	空間電位発生装置、空間電位発生装置を利用した鮮度保持装置及び空間繊維発生装置を備えたフライヤー	韓国	申請中	後藤錦隆
第15/597161号	空間繊維発生装置を備えたフライヤー	America	申請中	後藤錦隆
第15/646093号	空間電位発生装置を利用した鮮度保持装置	America	申請中	後藤錦隆

business concept



DENBA Co.,Ltd.



Corporate philosophy · Causes of development

DENBA is world's first revolutionary technology

Until now

Freshness preservation and thawing technique needs expensive equipment with high voltage. 5000-10000V

In order to meet up with various kinds of customer request. Agua shouji developed DENBA products.



**DENBA contribute to supply Fresh food all
over the world.**

『DENBA TECHNOLOGY』

World's first, electro potential technology
Activate life forms at atomic level

DENBA Features

DENBA

Food loss
Reducing
Technology

Retrofitting

Can be installed onto existing equipment

Capital investment required for new equipment is costly and risky. New equipment such as refrigerators, freezers and oil tanks are not needed for installation of DENBA.

Latest Tech

Latest technology that surpass all others

Though charging electric into freezer and oil tank has been implemented for many years, none have yet to be able to discharge static current into airspace, DENBA can.

Major Backer

Support from listed company in Japan

With faith in our technology, some of the top listed company in Japan have supported and cooperate with us. Relationships and cooperation with governments are currently underway.

Overwhelming Low Cost

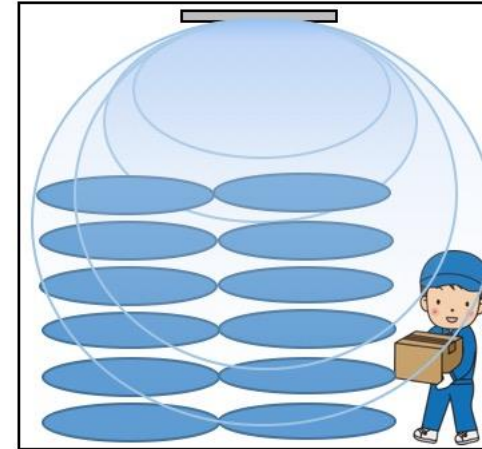
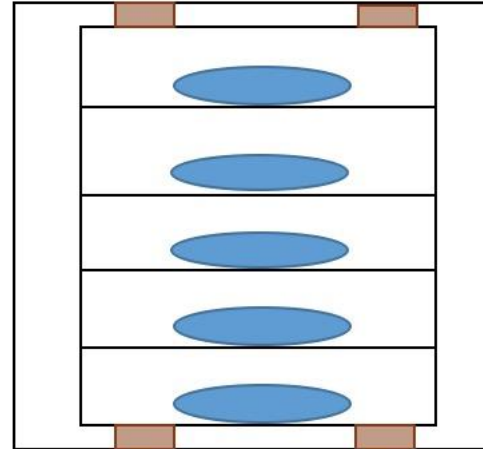
Improves user experience and ecology

In a competitive low growth environment, it is important to utilize everything that is already available. It is our mission to provide such technology that is helpful to the society.

Difference from other companies



We charge high voltage of 3000V ~ 10000V directly to foodstuffs and keep freshness, freezing and thawing. A similar electric field device places a stainless steel plate in all surface of the refrigerator, the cost of additional installation will be high. Also, other companies need very high expenses for relocation or removal.



Foods are charged with low voltage and low frequency in the space, freshness maintenance, freezing and thawing are carried out. Since it forms static electric wave throughout the space, it will cope with various places and situations. Also relocating, ours are inexpensive and easy to be relocated.

	Other companies	DENBA +
Capital investment	Expensive	Inexpensive
Internal capacity	Less 15%	Same
Charge voltage to foods	3000~10000V	10V
Safeness	Low	○PSE Certified



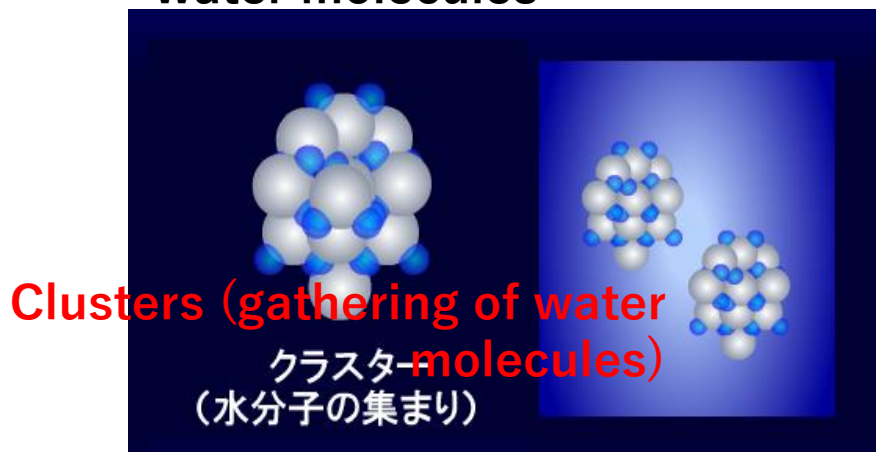
Fresh Food Revolution

新鮮美食革命

DENBA



- Apply wavelength to resonate with water molecules



DENBA + activates cells by making water molecules resonate, more exercise, finer cluster of water molecules, by giving the same level of wavelength as water molecular oscillation, long term preservation that it does not freeze even below freezing point. In addition, it can suppress the occurrence of bacteria and reduce the loss rate as much as possible.

Fresh Food Revolution

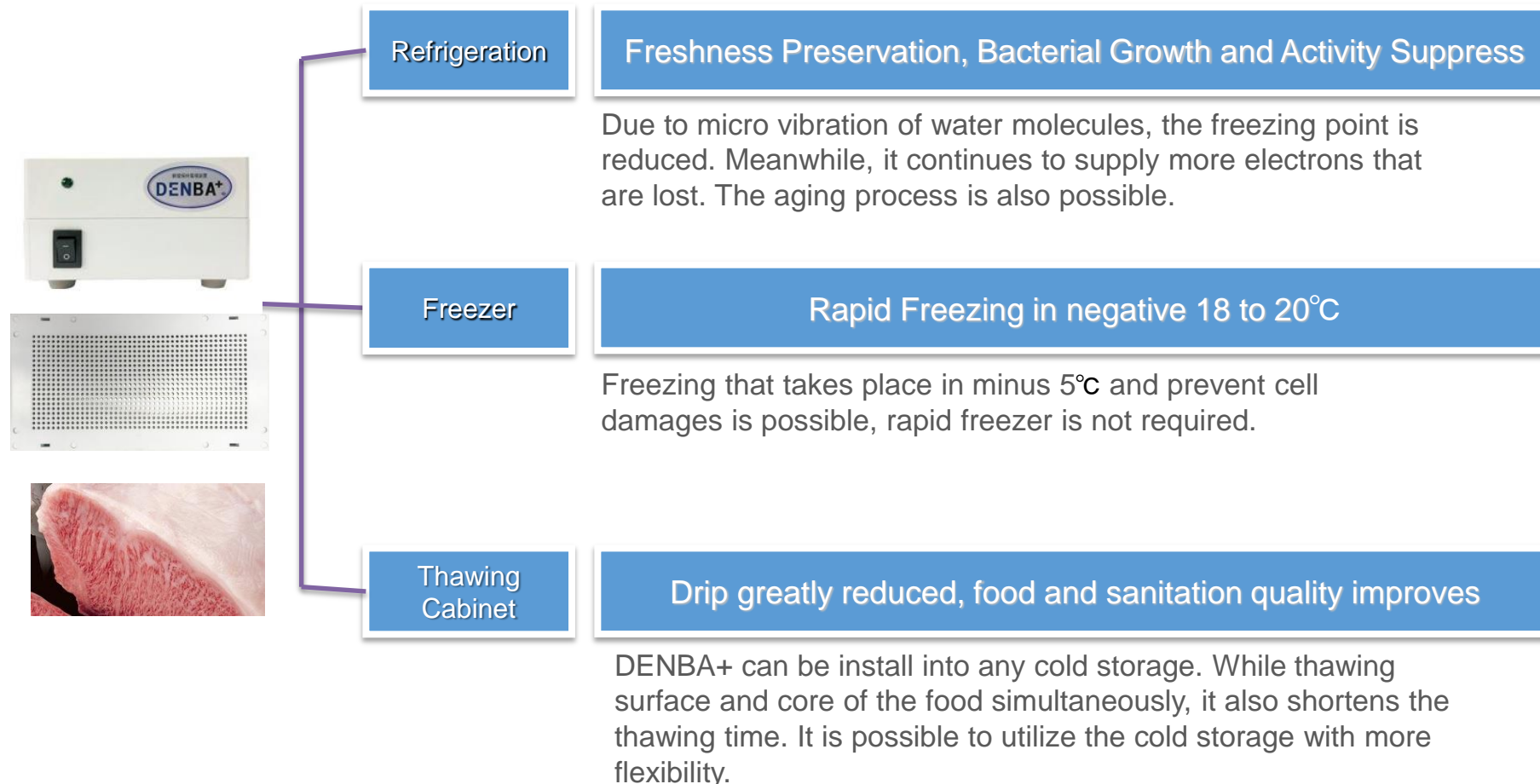
新鮮美食革命



- ▶ Ice crystals applied with DENBA + have been proven that water molecules are clustered by electron microscopic vibrations, the crystals are spherical with no corners, and freezing is possible without destroying the cells. DENBA + water electron micro vibration, water molecules always resonate and boiling point is lowered, so moisture evaporation is possible even at lower temperatures than usual. Verified by : Masaru Emoto Masaru Office (Test organization)



DENBA Actual Cases



Beef Bowl Refrigeration Preservation



Time Simulation for Bacteria Growth (1g worth of Bacteria)

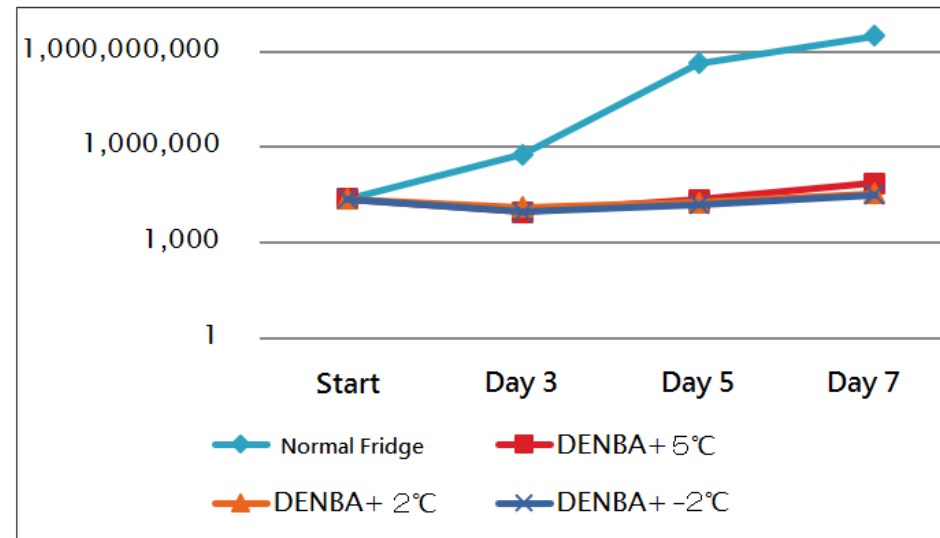
300> = 0~300/g No notable bacteria growth.
 10,000+ = 10,000~100,000/g, notable taste difference.
 ※ = Countless bacteria, notable spoiled odor.

Target: Suppress Bacteria ・Keep Fresh

Set Temperature: 5°C、2°C、-2°C

Test Material: Beef

Method: 3 Hour, 3 Days, 5 Days and 7 Days



Refrigeration	Start	3 rd Day	5 th Day	7 th Day
Normal Refrigeration	24,000	590,000	420,000,000	3,100,000,000
DENBA+ 5°C	24,000	9,800	22,000	74,000
DENBA+ 2°C	24,000	13,000	18,000	35,000
DENBA+ -2°C	24,000	9,300	16,000	32,000



DENBA Co.,Ltd.

Comparison in beef refrigerated storage

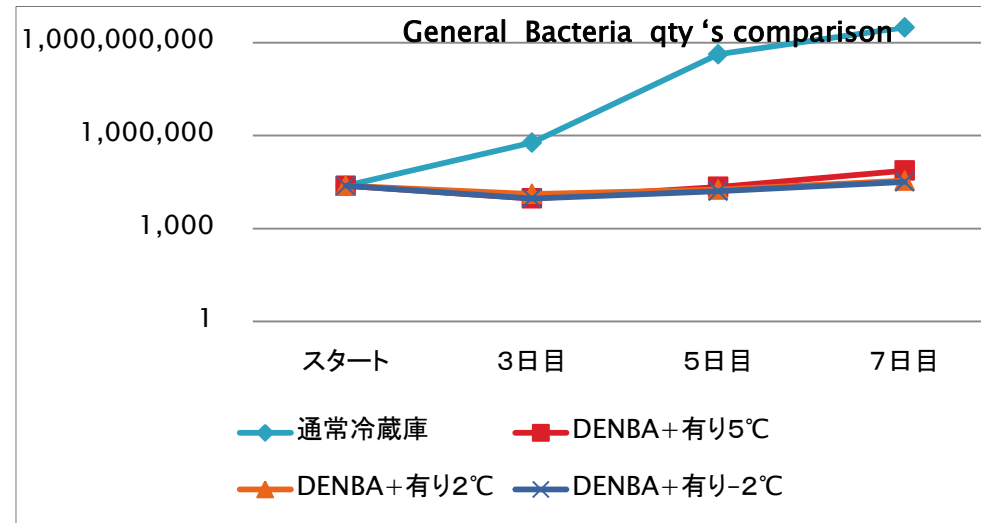
Bring the beef from Sukiya(Beef Bowl Restaurant) to Japan Food Analysis Center and make analysis

Temporal transition of general bacteria

- (Number of bacteria per, 1 g)
- Target: suppression of general bacteria · freshness preservation
 - Set temperature: 5 °C, 2 °C, -2 °C
 - Material : Beef
 - Method: 3hr, 3 days, 5 days , 7 days comparison



300> = 0 to 300 / g, showing almost no change in the sensitive test
 Over 100,000 = 100,000 to 1 million / g, it shows a slight change in flavor
 * = Infinite case, remarkably smells off odor (putrid smell)



Refrigeratiion	Start	3days after	5days after	7days after
General Fridge	24,000	590,000	420,000,000	3,100,000,000
DENBA+ 5°C	24,000	9,800	22,000	74,000
DENBA+ 2°C	24,000	13,000	18,000	35,000
DENBA+ -2°C	24,000	9,300	16,000	32,000



DENBA Co.,Ltd.

Freshness retention comparison



After 10 Days can be eaten



After 6 Days. Already Rotting



After 10 Days can be eaten



After 6 Days



After 10 days can be eaten



After 4 days



After 10 days can be eaten



After 4 days



After 105 Days can be eaten



After 105 Days, Already Rotting



After 10 days



After 10 days

Defrost Comparison

Mami Mart Group



Food Type	DENBA Defrost	Normal Defrost
Beef 2t・Pork 1t・Chicken 1t	Reduce 95% of dripping	Drips are everywhere

Meat Section Rep. : We are a factory that supplies 65 supermarkets, defrosting around 2.5 to 4 tons of meat everyday. It was common to see floor filled with blood after defrost. After DENBA+ was installed, the dripping have reduced greatly. It is possible to provide quality meat to customers like never before.

- 1) Loss weight reduced, profit goes up.
- 2) Reduce cost for cleaning operations.
- 3) Improvements on product sanitation.
- 4) Reduce drips and taste lost, better customer satisfaction.



- This is defrost process done in 20°C. The surface is dry while the drips of blood filled the ground.
- DENBA+ defrost kept the freshness, even after the process the freshness is still maintained.
- DENBA is able to keep freshness even after freezing and defrosting. The meats are sold with the same price yet the quality has increased, satisfying all customers.



Freezing & Thawing Comparison

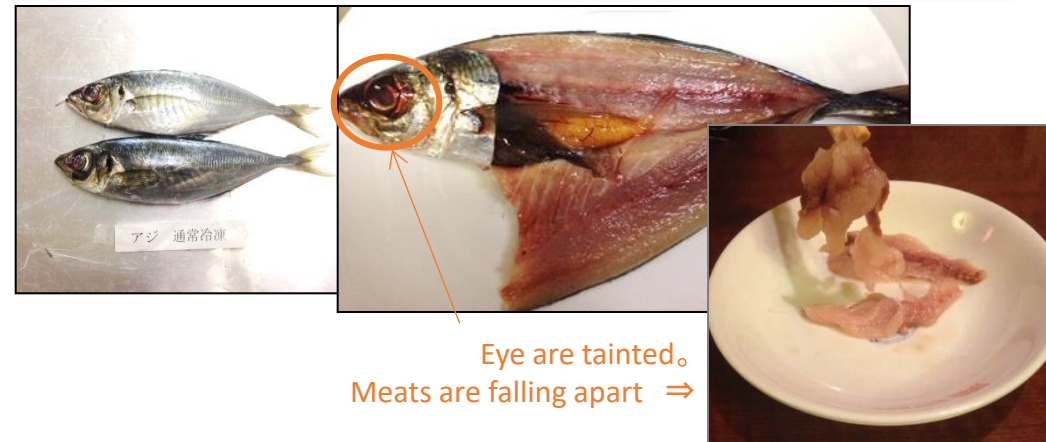
Horse mackerel Supplied by: Tsukiji



-20°C Normal Freezing



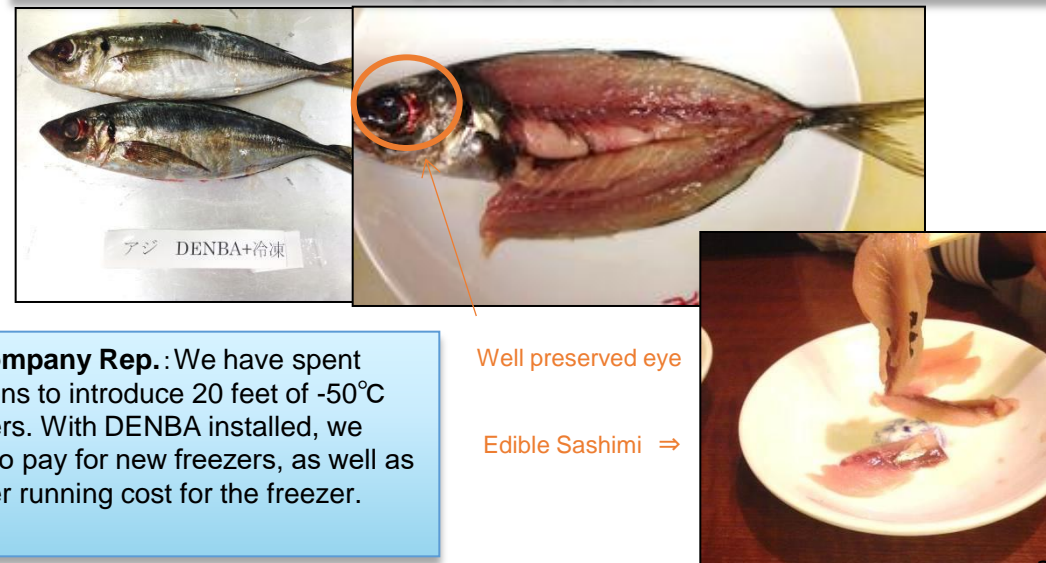
Normal Defrost



-20°C DENBA+ Freezing



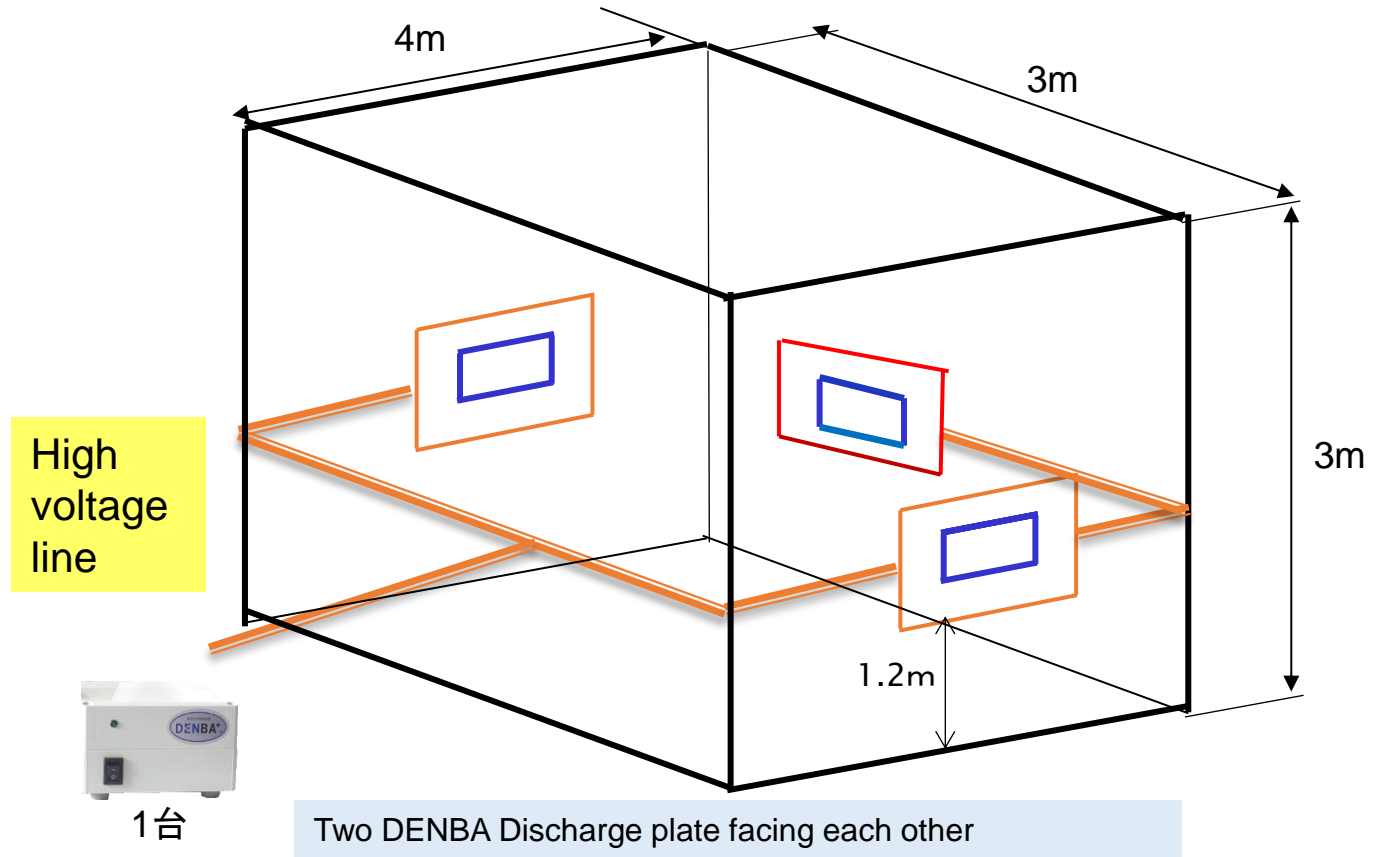
DENBA+ Defrost



Fish Restaurant Owner/Chef: Because most of our fishes are blue-backed, it is very easy for bacteria to grow. It is impossible to make Sashimi out of frozen fishes like these. With DENBA freezing, fish still taste great after defrost. You can tell the freshness of it when slicing it.

Trading Company Rep.: We have spent eighty millions to introduce 20 feet of -50°C rapid freezers. With DENBA installed, we don't have to pay for new freezers, as well as having lower running cost for the freezer.

Reference picture in case of setting DENBA Discharge plate with wall for large size

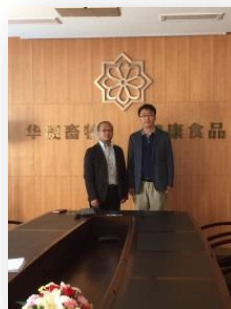


DENBA world



DENBA Co.,Ltd.

DENBA+ Worldwide Partnership



Related Firms

Container and Truck DENBA refrigeration and freezing



DENBA+ System

Freshness Preserving Commercial Refrigerators





中国 Haier

Haier | 众创空间

并联交互 创新创客

2016海尔模块商方案交互日

精 / 彩 / 回 / 顾



2016年海尔模块商方案交互日11.24-25日在海尔信息园A10座成功召开，有22家供应商应邀前来参展，与海尔研发人员600余人进行现场交流互动，给集团各产品部研发、企划等工程师带来样品100余款，项目76多个，其中33个在海尔首发，为海尔集团新品开发设计提供了一流的资源。



DENBA Co.,Ltd.

CHINA Haier



— 2017年 — 海尔金魔方奖入围名单

金魔方奖是海尔表彰供应商紧跟海尔进行转型，以模块化方案创造用户需求的最高奖项。

2017金魔方奖12月份入围名单

序号	厂家编码	供应商名称	产品线	项目评选来源
50		北京深度搜索科技有限公司	冰箱	交互日
51		电霸鲜（北京）商贸有限公司	冰箱	交互日
52		Hitachi-LG Data Storage, Inc.	空调	交互日
53		苏州法尔玛电器有限公司	空调	交互日
54		Pomelo Tech 柚子移动技术有限公司		最佳平台建设奖
55		Morgen Design 摩根设计		最佳平台建设奖
56		北京索为系统技术股份有限公司		最佳智能制造奖
57		菲尼克斯（中国）有限公司		最佳智能制造奖
58	V12973	青岛宝井钢材加工配送有限公司	白电	最佳供应链创新奖
59	V98500	海尔特种钢板研制有限公司	白电	最佳供应链创新奖
60	V9019858	青岛鼎佳电子有限公司	空调	最佳质量奖
61	V12808	日本电产芝浦（浙江）有限公司	空调	最佳质量奖
1	V13445	embraco siovakia s.r.o	冰箱	模块商资源平台、科技日
2	V13509	SEGOS CO.,LTD	洗涤	模块商资源平
3	V12878	安徽聚隆传动科技股份有限公司	洗涤	模块商资源平
4	V12852	安徽毅昌科技有限公司	空调	模块商资源平

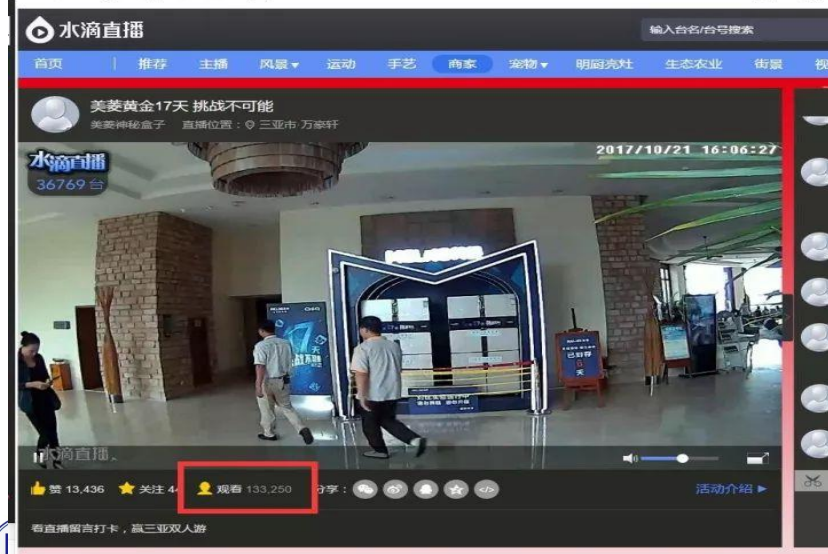


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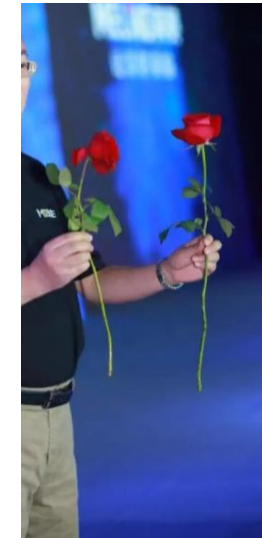


China's leading home appliance make Hefei Meiling Co.,Ltd Fridge with DENBA + Launched on Nov 1, 2017



To compare the freshness preservation, they prepared a new type fresh refrigerator and regular refrigerator, sealed the door completely, watching the situation for 24 hours for 17 days via internet, until Nov 1, 2017, then opened both refrigerators and compared freshness. On Nov 1, at 19:00 Japan time, a meeting was held to show how the freshness holding comparison was done, and the status was relayed by the web, 30 million people in 5 hours watched.

Sealed the refrigerators for 17 days, 24 hours internet relay 30 million people watch 5 hours after the start!



The items to be compared were rose flowers, beef, chicken, spinach, salmon, and all the items in the fridge with DENBA were fresh compared to the state of the freshness in the normal refrigerator.



DENBA Co.,Ltd.

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World Record Association certified Freshness Preserving Refrigerator and Frozen-Thawed Refrigerator both equipped with DENBA No 1 in the world.

M鲜生 世界纪录

MELING 美菱



世界上冷藏保鲜时间最长的家用冰箱



世界上冷冻营养流失率最低的家用冰箱



Advertisement of Hefei Meiling Co.,Ltd

MELING 美菱 CHI Q

分子级监控 养鲜黑科技

美菱M鲜生 冰箱

1级 新国标能效

MELING 美菱 让美好来临

[M鲜生为新鲜而生]

——水分子激活保鲜技术——

水是生命之源！生命的70%以上是由水分子构成，“水分子激活保鲜技术”可以使食物中的水分子震动，激活水分子等于激活细胞，可以加快代谢，减少食物细胞内环境，抑制细菌的滋生，从而延长食品的新鲜度。

M鲜生之黑科技

- 共振力：**“水分子激活保鲜技术”使食物中水分子分子震动，激活细胞，提升食物新鲜度。
- 震荡力：**打破细胞中的水分子分子团簇，给细胞加热，升温快，减少食物细胞内环境。
- 穿透力：**“水分子激活保鲜技术”可以渗透到细胞，激活食物中的水分子结构，给细胞提供充足的新鲜度。

M鲜生之BCD-660W1P1MBA

水分子激活保鲜技术 巨容豪华三温区养鲜空间

闪电 变频 触控 大屏 触控屏 触控屏 触控屏 触控屏



Logo strategy of DENBA with the refrigerator.

We succeeded in unitization for the first time in the world. It was recognized the safety and effectiveness of installing an existing refrigerator and it became commercialized as a household refrigerator.

We are aiming at changing the common sense about the freshness in the world. We are also aiming at utilizing our products to be positioned



DENBA Co.,Ltd.

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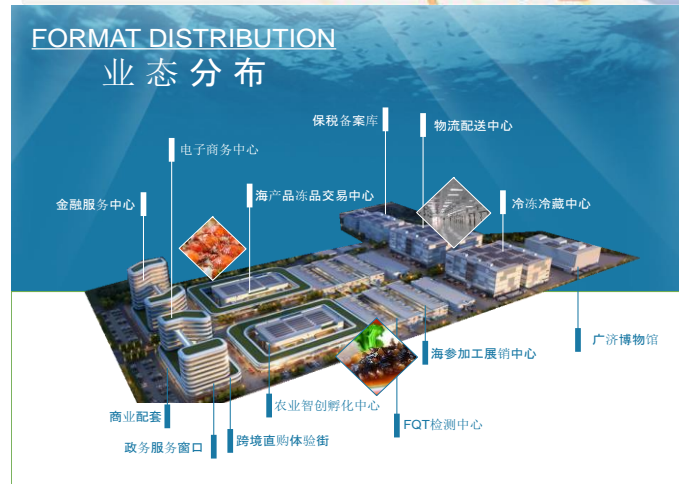
Agreement of cooperation with major logistics company in China.



冷冻冷藏中心

FREEZING CENTER

- 总库容量30万吨，按照国家储备库标准兴建，其中一栋进出口保税备案库，进口冷冻肉类、水产品冷链查验和储存一体化设施资格正在审批中；
- 引进日本电霸静电技术，引领全球冷冻、冷藏、解冻、烘干的保鲜技术革命，极大的提升冷冻食品的品质；
- 冷冻冷藏库将引进当前最先进的二氧化碳制冷技术，安全、环保、绿色、节能；
- 将采用全天候不间断服务，确保所有出入库食品的安全、



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Agricultural Science Institute of China signed joint research agreement in January 2017

Announcement of Paper by China Agricultural Science Institute

The Agricultural Science Research Institute of China is established on Mar 1, 1957, a nationwide integrated agricultural science research institute and also is at the center of agricultural science research.

低压静电场下不同隔距冻结-解冻对牛肉品质的影响

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2. 天津市食品生物技术重点实验室, 天津商业大学生物技术与食品科学学院, 天津 300134

摘 要:为研究静电场 (low voltage electrostatic field, LVEF) 辅助冻结-解冻对牛肉品质的影响, 采用自主研发电行为式材料, 探究与静电场发生场强分别为11、20、30、40、50 kV/m (试验组, 场强范围为18 °C, 解冻温度为4 °C) 和250 kV/m (未加静电场, 对照组, 条件同上) 两种冻结-解冻过程中的电压变化, 对比分析了温度曲线、色泽、解冻汁流失率、汁液中蛋白质含量、感官性状及肌肉嫩度等指标, 考察静电场对牛肉品质中不同成分的影响规律。结果表明, 与对照组相比, 试验组牛肉在冻结过程中蛋白质含量和水分含量均有所增加, 冻结过程中水分流失率、解冻率、解冻汁流失率、汁液中蛋白质含量和感官性状均有所提高 ($P < 0.05$)。同时, 冻结速率越快, 试验组牛肉解冻后色泽、嫩度、解冻率、解冻汁流失率、汁液中蛋白质含量和感官性状均有所提高。其中, 与静电场强度为50 kV/m 的冻结速率最快, 总解冻率和色泽改善度分别为10.47%、21.77%和28.71%, 显著高于对照组的10.74%、17.78%和24.73% ($P < 0.05$)。解冻汁流失率、感官性状和解冻汁中蛋白质的改善程度分别为4.10%、4.28%、6.77%和2.61%, 均显著高于对照组。结果表明, 静电场强度为50 kV/m 的冻结速率最快, 且解冻率、汁液流失率、感官性状、色泽、嫩度、解冻率、解冻汁流失率、汁液中蛋白质含量和感官性状均有所提高, 且与静电场强度为50 kV/m 的冻结速率最快。

关键词: 牛肉; 静电场; 冻结; 解冻; 品质

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Li Xia, Qian Shuyi, Yang Fangwei, Sun Zhen, Shang Ke, Zhang Chunhui. Effects of different power under low voltage electrostatic field on beef freezing-thawing process[J]. Transactions of the Chinese Society of Agricultural Engineering (Transactions of the CSAE), 2017, 33(8): 278-285. doi: 10.11975/j.issn.1674-2809.2017.04.0278. <http://www.cnki.net>

0 引言

牛肉中含有丰富的蛋白质和人体必需氨基酸, 营养价值高, 风味独特, 深受消费者喜爱。牛肉作为牛羊肉的主要消费肉种, 其作为牛肉最重要的加工方式, 可以有效抑制微生物生长繁殖和降低的脂肪, 延长保质期^[1]。随着消费者对食品安全问题的关注度不断提高, 牛肉品质与食品安全问题的关注度不断提高。近年来, 研究者们开始关注牛肉品质与食品安全问题的关系, 并提出了许多新的加工方法, 如高压电辅助冻结-解冻、超声波辅助冻结-解冻等^[2]。以上方法虽然, 静电场辅助冻结-解冻技术具有效率高、设备简单、操作简便等优点。目前, 国内静电场技术应用于牛肉品质研究主要集中于

于重量和质地的控制^[3], 近期也有研究关注静电场辅助解冻对肉质嫩度及其对食品产生有益影响^[4]。与常规解冻相比, 高压静电场解冻技术可以缩短冻结牛肉的解冻时间, 显著减少解冻过程中汁液流失, 同时牛肉色泽和嫩度也得到改善。然而, 高压静电场的输出电压较低, 安全性较差, 具有明显的局限性。另外, 由于牛肉色泽和嫩度与解冻、高压静电场输出电压一般不超过2 500 V, 电流不超过0.2 mA, 可在空气中形成电离离子环境, 因此静电场辅助解冻, 达到解冻目的, 具有安全性高、设备简单、节能环保等优点。

静电场作为一种新型非热技术, 已经引起了广泛关注。在肉品冻结与解冻技术革新上提供了新的思路。然而, 静电场在食品贮藏保鲜技术的应用尚处于初期阶段, 其在食品冻结-解冻技术方面的应用尚有待进一步研究。近期研究者们将静电场应用于牛肉品质与解冻, 研究者们开始关注静电场辅助冻结-解冻技术对牛肉品质的影响, 并提出了许多新的加工方法, 如高压电辅助冻结-解冻、超声波辅助冻结-解冻等^[2]。以上方法虽然, 静电场辅助冻结-解冻技术具有效率高、设备简单、操作简便等优点。目前, 国内静电场技术应用于牛肉品质研究主要集中于

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低压静电场下不同隔距冻结-解冻对牛肉品质的影响

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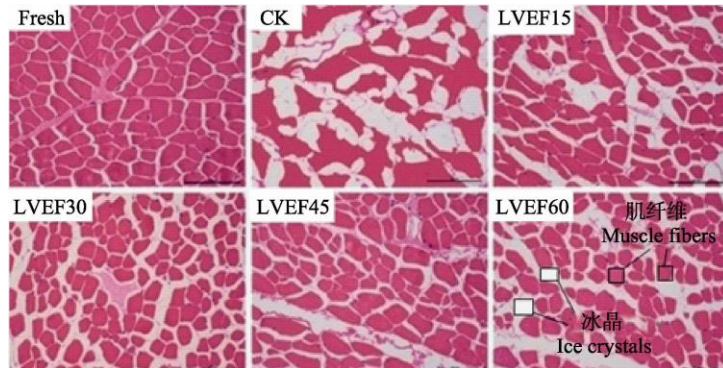
Under the the low pressure electrostatic field, how the different freeze-thawing distances would affect the quality of beef.

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State of cells when frozen



Fresh Fresh Meat
 CK Usual Frozen
 Under, the distance from DENBA+
 LVEF 15cm
 LVEF 30cm
 LVEF 45cm
 LVEF 60cm

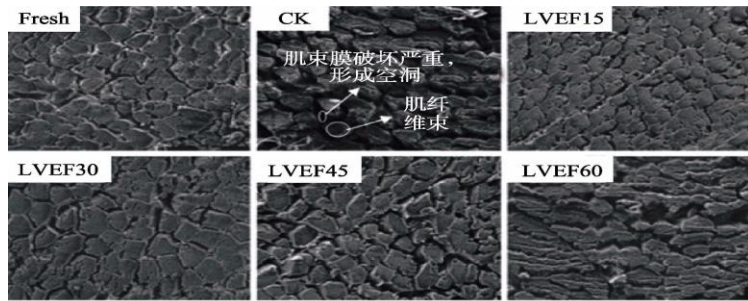
Treatment	解冻ドリップ流失率%	ドリップ中のタンパク質量%	調理 損失
Treatment	Thawing loss rate/%	Protein content of drip/%	Cooking loss/%
CK	8.37 ± 0.25a	0.61 ± 0.01a	128.30 ± 0.23a
LVEF15	5.44 ± 0.13b	10.29 ± 0.07b	22.70 ± 0.25b
LVEF30	4.19 ± 0.09c	9.91 ± 0.03c	20.02 ± 0.20c
LVEF45	4.24 ± 0.16c	9.21 ± 0.09d	21.53 ± 0.35b
LVEF60	5.19 ± 0.24b	10.26 ± 0.06b	22.10 ± 0.18b

Fig 3 Micrograph of frozen beef muscle fibers (200 times) after different freezing treatments.

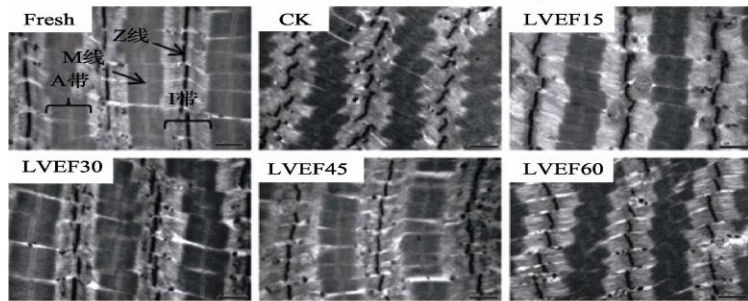
Fig.3 Micrograph of beef muscle fibers and ice crystals formed after different freezing treatments (200×)

2.3 Effect of low voltage electrostatic field on beef color and gloss.

Observe longitudinal section of muscle fiber bundle with TEM



a. 扫描电镜观察牛肉微观结构 (500×) SEM of beef
a. SEM of beef microstructure (500×)



b. 透射电镜观察牛肉超微结构 (40 000×) TEM of beef
b. TEM of beef microstructure (40 000×)

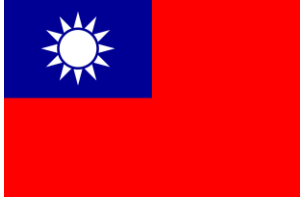
Fig. 5 Microstructure of beef after different freezing and defrosting
TEMで筋肉繊維束の縦断面を観察すること、新鮮牛肉及び違う条件で凍結—解凍した牛肉をそれぞれTEMで観察する、その結果は図5b(40 000× 倍拡大)。図5bから見ると、新鮮牛肉筋原繊維構造は整合性いい、筋肉繊維束の排列密集、A帯、I帯はつきり読みやすい、Z線、M線も明確かつ整合性いい。この結果から低圧静電場環境で凍結／解凍した場合には牛肉の筋繊維組織構造を自然なまま維持する上で明確な効果が有ると見られる。陳韜教授は、筋肉組織の変化と保水性の研究を通して、筋原組織の整合性と筋肉の保水性には顕著な相関性が認められ[21]、筋肉繊維束組織構造の整合性と密集度合が崩れると、肉の弾力性と食感が低下すると指摘しています。低圧静電場環境で凍結／解凍した牛肉サンプルの筋肉繊維束組織構造は、ほぼ自然に近い整合性のある密集度合を保持しドリップ流失率の低さと、良好な食感の維持に効果があるとの研究成果が示されています。



Seafood kept with DENBA for 10 days is still fresh.



Freshness preservation
DENBA + fishing boat



Establishment of a joint venture with Taiwan Fishery Association.



華偉國際集團
董事長
台灣漁業組合
會長

黃一成 樣



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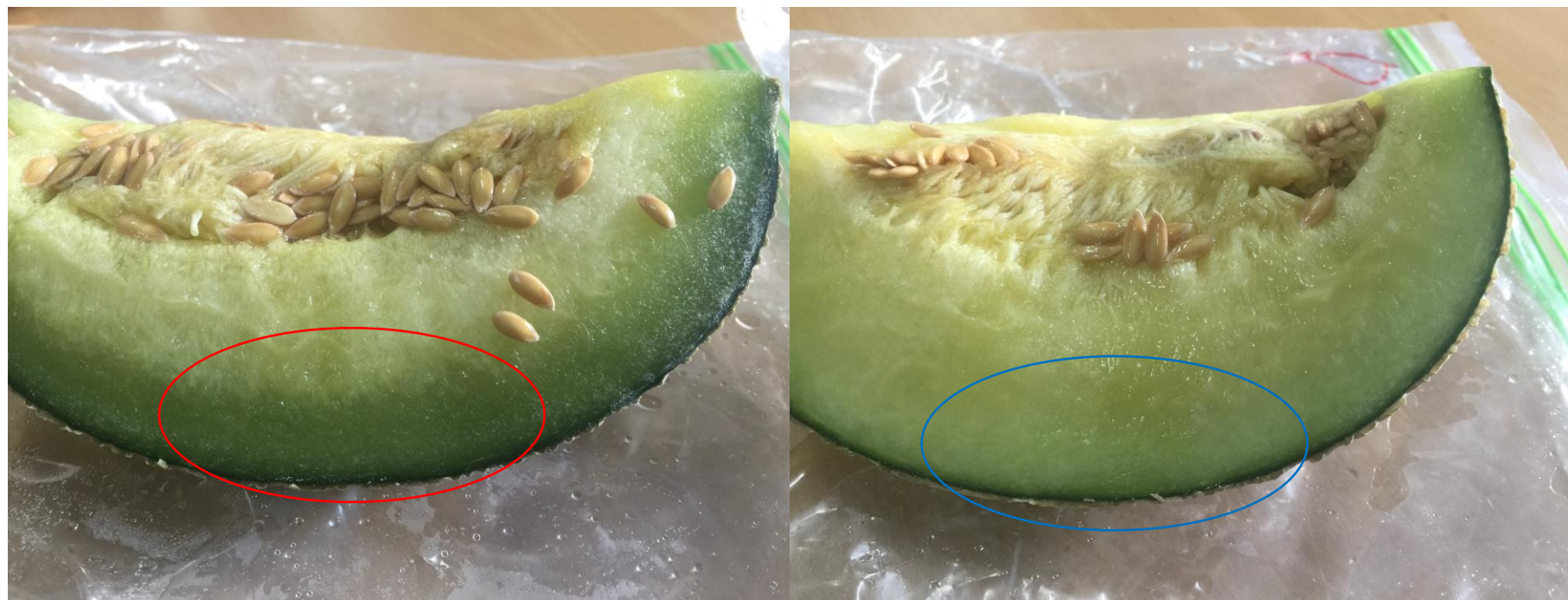


Korea CARRIER made contract in Jan





Melon, 6th days after in the fridge temperature - 2 Deg C



Normal refrigeration:

The melon is frozen in the portion from the outer part to the inside. It can not be eaten.

DENBA refrigerated:

The melon is not frozen and kept fresh. Feel softness after the finger touches. The same freshness as before.



Establishment of Indian agent








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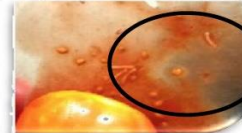


Comparison of tomato freshness preservation in India

Storage temperature: 10 to 30 Dec C in NON refrigerated warehouse or outdoor.

WITH DENBA (Tomato No.1389) This trial was run for the change of Colour from orange to full red at Sehnit									
Date	No. of days	Gross wt in kgs	Weight loss %	Freshness on Opening (1-10 scale)	Quality Parameters				
					Skin colour	Firmness	Reddening	Fungus	Moisture
11.11.2016	1	100.146		2nd-3rd	Green/orange	Tender	NO	No	No
12.11.2016	2			2nd-3rd	Green/orange	Tender	NO	No	No
13.11.2016	3			2nd-3rd	Green/orange	Tender	NO	No	No
14.11.2016	4			3rd	Orange/Red	Tender	Yes	No	No
15.11.2016	5			4th	Orange/Red	Tender	Yes	No	No
16.11.2016	6			5th	Red	Tender	Yes	No	Yes
17.11.2016	7			6th	Red	loose	Yes	No	Yes
18.11.2016	8	88.424		6th	Red	loose	Yes	No	Yes
		11.722							
			11.70%	88.30% Recovery					
Temperature : 10c To 30c Humidity : 26% To 45%									
Sugar Content is very low in Tomatoes The Slices are fine and Water Content is also High No Bacteria formation or Worms in the Tomatoes									
									
   									

DENBA : Day 8 Loss Rate 11.70% **Reduced 74% loss**
Condition of nearly perfect freshness

WITHOUT DENBA (Tomato No. 1389) This trial was run for the change of Colour from orange to full red, Trials for the Normal condition for Tomatoes at Sehnit									
Date	No. of days	Gross wt in kgs	Weight loss %	Freshness on Opening (1-10 scale)	Quality Parameters				
					Skin colour	Firmness	Reddening	Fungus	Moisture
11.11.2016	1	78.546		2nd-3rd	Green-Orange	Tender	No	No	No
12.11.2016	2			3rd-4th	Orange-Red	Tender	Yes	No	No
13.11.2016	3			4th-4th	Orange-Red	Tender	Yes	No	No
14.11.2016	4			4th5th	Red	Soft	Yes	No	No
15.11.2016	5			5th-6th	Red	Shrivel	Yes	No	Yes
16.11.2016	6			6th	Red	Shrivel	Yes	No	Yes
17.11.2016	7			6th	Red	Shrivel	Yes	No	Yes
18.11.2016	8	54.714		6th	Red	Shrivel	Yes	No	Yes
		23.832							
			30.34%	69.66% Recovery					
Temperature : 10c To 30c Humidity : 26% To 45%									
Sugar Content is High in Tomatoes The Slices of Tomato are not good and lot of water dripping Water Content is Low Worms and Bacteria formed in the Tomatoes									
   									

Normal Storage : 8Day 8 Loss Rate 30.34%
Rotten, insects are emerging.





Aging



Drying



Fresh Preservation

Only one inventive technology in the world DENBA +



Thawing



FREEZING



Heat-ing