

## **Plasmacluster Ion Technology\*<sup>1</sup> Shown to Promote Hair Growth by Improving Barrier Function of Scalp\*<sup>2</sup> (Improving Scalp Environment)**

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Sharp Corporation has shown that Plasmacluster ion technology is effective in improving the barrier function of scalp and promoting hair growth in tests conducted on patients undergoing mesotherapy\*<sup>3</sup> for hair growth. Tests were commissioned to National Trust Co., Ltd. (head office: Minato-ku, Tokyo; president: Hideki Setoyama), and conducted at the Shinjuku Ouka Clinic of the HARG Treatment Center (location: Shinjuku-ku, Tokyo; chief physician: Hirotaro Fukuoka) using an ion-generating device for clinical testing (ion concentration of approx. 1.5 million ions/cm<sup>3</sup>).

In addition, in tests commissioned to Soiken Inc. (head office: Toyonaka City, Osaka Prefecture; CEO: Tomohiro Sugino), a hair and beauty care testing device for clinical testing (ion concentration of approx. 3.3 million ions/cm<sup>3</sup>) was used on healthy women. Results showed an improvement in the barrier function of the scalp, a decrease of scalp oil, and a decrease in the microorganism (malassezia fungi) causing dandruff and itching. Many of the test subjects surveyed after the tests said that they no longer had problems with itchy scalp and that it felt like their hair had more volume.

There has been a focus in recent years on preventing baldness and caring for the scalp in response to people's hair concerns as they get older. Against this background, Sharp looked at the water molecule clusters that make up the company's Plasmacluster ions. In 2010, in joint tests conducted with Professor Michio Niwano of the Research Institute of Electrical Communication, Tohoku University, it was shown\*<sup>4</sup> that the water molecules of Plasmacluster ions form a water molecule coat on the skin. Joint tests with Soiken showed\*<sup>5</sup> that the water coating function of the water molecules has beautifying effects (moisture retention\*<sup>6</sup>, resilience improvement\*<sup>7</sup>, smoothness and radiance improvement\*<sup>7</sup>, and oil reducing effect\*<sup>7</sup>), and the effect of reducing bacteria that cause rough skin.

Since 2000, Sharp has been conducting academic marketing\*<sup>8</sup> showing the effects of Plasmacluster ions in collaboration with world-class third-party test institutes. So far, Sharp and numerous third-party test institutes\*<sup>9</sup> have shown beautifying effects, such as beautification of skin and hair, and have confirmed the safety\*<sup>10</sup> of Plasmacluster ions. As Plasmacluster ion technology advances, Sharp will continue to prove its effects in order to contribute to the field of beauty and hair care.

### **Comment from Hideki Setoyama, President, National Trust Co., Ltd.**

The tests confirmed that patients undergoing mesotherapy for hair growth exposed to Plasmacluster ions showed a trend of reduced transpiration of moisture from the scalp, as well as a significant increase in the number of hairs that grew. It is thus very probable that Plasmacluster ion technology can help improve the scalp environment.

### **Comment from Tomohiro Sugino, CEO, Soiken Inc.**

In double-blind tests, Plasmacluster ion technology was found to improve scalp functions, and test subjects surveyed after the tests said that they no longer had problems with itchy scalp and that it felt like their hair had more volume. This shows that Plasmacluster ion technology constitutes effective treatment in the field of hair and beauty care. Plasmacluster ion technology thus holds promise for improving the scalp environment and helping provide customers with healthy, sanitary hair and beauty care.

- \*1 Plasmacluster is a registered trademark of Sharp Corporation.
- \*2 The function of retaining moisture in the scalp.
- \*3 A type of hair loss treatment.
- \*4 Announced on June 4, 2010.
- \*5 Announced on August 5, 2010.
- \*6 Announced on February 17, 2010.
- \*7 Announced on June 4, 2010.
- \*8 A marketing method in which a company collaborates with a leading research institute to gather and verify data on the effects of a certain technology, and then uses this data as the basis for commercialization of the technology.
- \*9 Current as of October 13, 2016.
- \*10 According to tests conducted by LSI Medience Corporation (inhalation toxicity test, eye and skin irritation/corrosion tests, teratogenicity test, and two-generation reproduction toxicity test).

## ■ **Hair Growth Promotion Verification Test**

### ● **Clinical testing institutes**

National Trust Co., Ltd.  
Shinjuku Ouka Clinic, HARG Treatment Center

### ● **Test conditions**

- **Test subjects:** Patients undergoing mesotherapy for hair growth (115 men and women in their 20s to 70s)
- **Assessment criteria:** Number of hairs, amount of transpiration of moisture from the scalp
- **Test period:** Approx. 3 months
- **Test method:** To assess the number of hairs that grow in the same spot, a 2-centimeter round spot was shaved on the right and left sides of the subjects' heads, and a tattoo was painted in the center of each shaved spot. Using an ion-generating device for clinical testing, the shaved spot on the right side was exposed to ions (ion concentration of approx. 1.5 million ions/cm<sup>3</sup>) for approximately 20 minutes each day. Once a month, mesotherapy was performed on the shaved spots on the right and left sides. Each month, the number of hairs that grew in both the shaved spots (surface area of 160 mm<sup>2</sup>) was counted.

● Test results

After three months, the number of hairs that grew on the shaved spots on the right side of the head, which were exposed to Plasmacluster ions, was found to be 2.5 times that of the shaved spots on the left side, showing a statistically significant increase\*<sup>11</sup>.



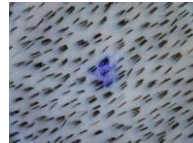
Photo 1: Clinical testing

Average number of hairs	Initially	After 1 month	After 2 months	After 3 months	(Hair/160 mm <sup>2</sup> ) Increase in number of hairs after 3 months
Right side (exposed to ions)	224.0	233.3	232.1	244.9	20.9
Left side (not exposed to ions)	219.0	226.9	224.7	227.2	8.2
Right-left difference	5.0	6.4	7.4	17.7	–

Test result 1—Subject: Female aged 50–59



Test result 2—Subject: Male aged 30–39



Left photos: Before start of test; right photos: after 3 months of exposure to ions

■ Scalp Environment Improvement Verification Test

● Clinical testing institute  
Soiken Inc.

● Test conditions

- Test subjects: 59 healthy people (women aged 40 to 63)
- Assessment criteria: Amount of transpiration of moisture from scalp, amount of scalp oil, amount of malassezia fungi on the scalp, visual analogue scale (VAS)\*<sup>12</sup>
- Test period: Approx. 3 months
- Test method: In a randomized, double-blind, parallel group, comparative study\*<sup>15</sup>, two groups were exposed to airflow from a hair and beauty care testing device for clinical testing for 5 minutes a day for 12 continuous weeks. The test group of 29 people was exposed to airflow containing ions (concentration of 3.3 million ions/cm<sup>3</sup>) and the control group of 30 people was exposed to airflow containing no ions. The two groups were compared on the assessment criteria.



Photo 2: Using a hair and beauty care testing device for clinical testing

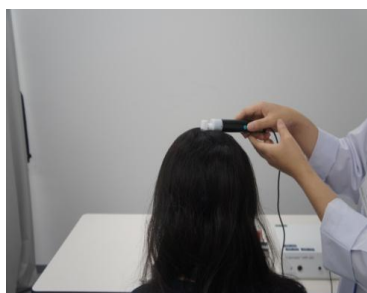


Photo 3: Measuring the scalp environment

## ● Test results

Compared to the test subjects exposed only to airflow containing no ions, the test subjects exposed to airflow containing ions showed lower levels of transpiration of moisture from the scalp, scalp oil, and the microorganism (malassezia fungi) that causes dandruff and itching.

In response to a VAS questionnaire administered before and after the test, compared to the test subjects exposed only to airflow containing no ions, the test subjects exposed to airflow containing ions showed a positive trend in the difference in value\*<sup>14</sup> on questionnaire items for “increased hair volume,” “dandruff concerns,” “scalp itchiness concerns,” “gray hair concerns,” “scalp odor concerns,” “and hair part concerns.” Likewise, on the questionnaire item “hair-loss concerns,” test subjects exposed to ions showed a positive trend in the difference in responses before and after the test\*<sup>14</sup>.

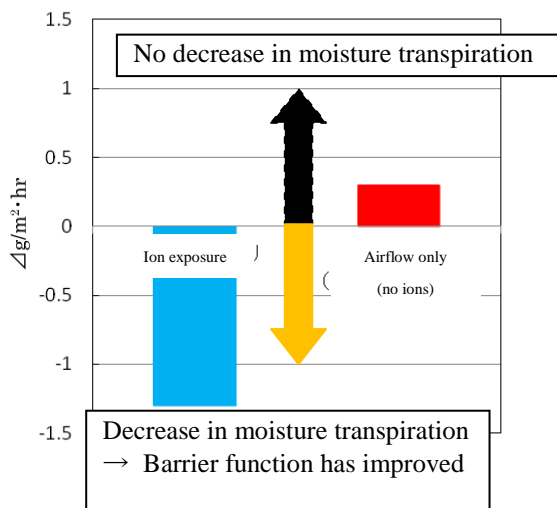


Chart 1: Comparison of transpiration of moisture from scalp (scalp barrier function)

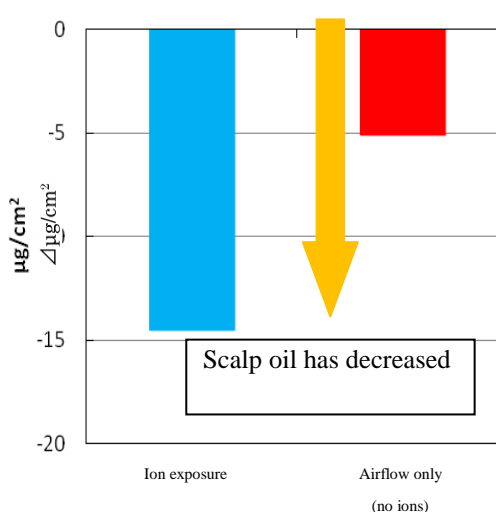


Chart 2: Comparison of amount of scalp oil

\*11 Test results confirmed a statistically significant p-value of 0.05 or less.

\*12 Visual analogue scale (VAS): A measurement of how the test subjects feel about the test (subjective measurement).

\*13 Randomized, double-blind, parallel group, comparative study: Test subjects and evaluators take the test without being told whether the airflow contains ions. This clinical testing method eliminates bias between test subjects and evaluators and allows for the objective discovery of the effect of the intervention.

\*14 Although the test results did not reach the statistically significant p-value of 0.05 or less, they reached a p-value of less than 0.20 or less, enough to confirm a positive trend for these questionnaire items.

## ■ National Trust Co., Ltd.

Established in 1998. Started Japan's first financial scheme for the liquidation of compensation and receivables in the medical care field. Its main areas of business are management support for healthcare organizations, management turnaround of facilities, new business startup, and business succession.

## ■ Shinjuku Ouka Clinic, HARG Treatment Center

Opened in 2012 as the Ouka Clinic, Oukaikai Medical Corporation. Specializes in HARG\*<sup>15</sup> (hair regenerative therapy) treatment, while instructing clinics around Japan in HARG treatment.

\*15 HARG: A regenerative method in which AAPE (Advanced Adipose-Derived Stem Cell Protein Extract), which includes more than 150 types of growth factors and extracted from stem cells (the starting point of all cells in the human body) is injected directly into the scalp to restore hair growth functions.

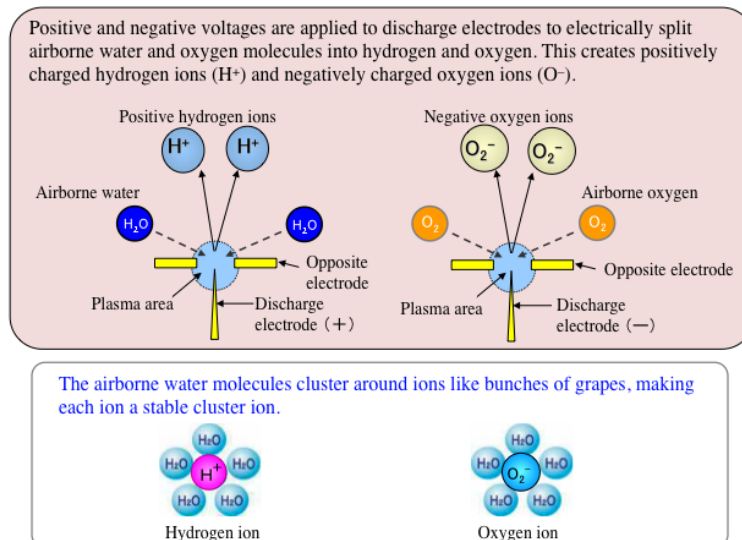
## ■ Soiken Inc.

Established in 2007. Conducts clinical evaluation tests for foods and equipment using in-house-developed biomarkers and evaluation systems, provides pharmaceutical marketing support, and carries out specific health guidance.

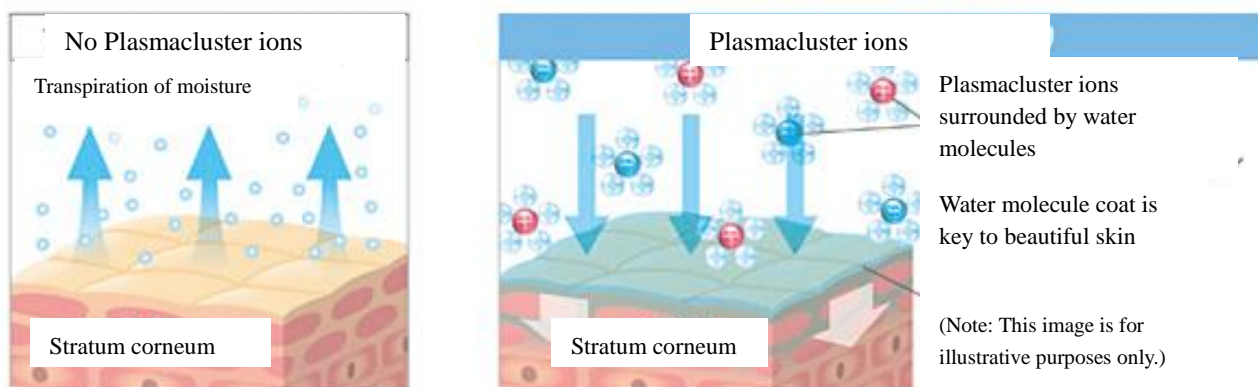
## ■ About Plasmacluster Technology

In Sharp's proprietary air purification technology, positively charged hydrogen ions ( $H^+ (H_2O)_n$ ) and negatively charged oxygen ions ( $O_2^- (H_2O)_m$ ) are discharged simultaneously. These positive and negative ions instantaneously bond on the surface of airborne substances such as bacteria, fungi, viruses, and allergens, becoming highly reactive OH radicals (hydroxyl radicals) that break down the proteins on the surface of these bacteria and other substances. By chemical reaction, the OH radicals work to suppress the activity of those substances.

### How Plasmacluster Ions Are Generated



## How a water molecule coat is formed with Plasmacluster ions



Skin surface (stratum corneum) dries out

Skin surface (stratum corneum) retains its moisture

- Test institute: Research Institute of Electrical Communication, Tohoku University

### 28 Research Institutes That Provided Data for Sharp's Academic Marketing

Target	Testing and Verification Organization	Country
Efficacy proven in clinical trials	Graduate School of Medicine, University of Tokyo / Public Health Research Foundation	Japan
	Faculty of Science and Engineering, Chuo University / Clinical Research Support Center, University Hospital, University of Tokyo	Japan
	Animal Clinical Research Foundation	Japan
	Soiken Inc.	Japan
	School of Bioscience and Biotechnology, Tokyo University of Technology	Japan
	National Trust Co., Ltd. / HARG Treatment Center	Japan
	National Center of Tuberculosis and Lung Diseases	Georgia
Viruses	Kitasato Research Center of Environmental Sciences	Japan
	Seoul National University	Korea
	Shanghai Municipal Center for Disease Control and Prevention	China
	Kitasato Institute Medical Center Hospital	Japan
	Retroscreen Virology, Ltd.	UK
	Shokukanken Inc.	Japan
	University of Indonesia	Indonesia
	Hanoi College of Technology, Vietnam National University	Vietnam
	Institut Pasteur, Ho Chi Minh City	Vietnam
Allergens	Graduate School of Advanced Sciences of Matter, Hiroshima University	Japan
	Department of Biochemistry and Molecular Pathology, Graduate School of Medicine, Osaka City University	Japan
Fungi	Ishikawa Health Service Association	Japan
	University of Lübeck	Germany

	Professor Gerhard Artmann, Aachen University of Applied Sciences	Germany
	Japan Food Research Laboratories	Japan
	Shokukanken Inc.	Japan
	Shanghai Municipal Center for Disease Control and Prevention	China
Bacteria	Ishikawa Health Service Association	Japan
	Shanghai Municipal Center for Disease Control and Prevention	China
	Kitasato Research Center of Environmental Sciences	Japan
	Kitasato Institute Medical Center Hospital	Japan
	Dr. Melvin W. First, Professor Emeritus, Harvard School of Public Health	US
	Animal Clinical Research Foundation	Japan
	University of Lübeck	Germany
	Professor Gerhard Artmann, Aachen University of Applied Sciences	Germany
	Japan Food Research Laboratories	Japan
	Shokukanken Inc.	Japan
	Chest Disease Institute	Thailand
Odors, pet smells	Boken Quality Evaluation Institute	Japan
Skin beautifying effects	School of Bioscience and Biotechnology, Tokyo University of Technology	Japan
Hair beautifying effects	Saticine Medical Co., Ltd.	Japan
	C.T.C Japan Ltd.	Japan
Working mechanism of inhibitory effects on viruses, fungi, and bacteria	Professor Gerhard Artmann, Aachen University of Applied Sciences	Germany
Working mechanism of inhibitory effects on allergens	Graduate School of Advanced Sciences of Matter, Hiroshima University	Japan
Working mechanism of skin moisturizing (water molecule coating) effect	Research Institute of Electrical Communication, Tohoku University	Japan