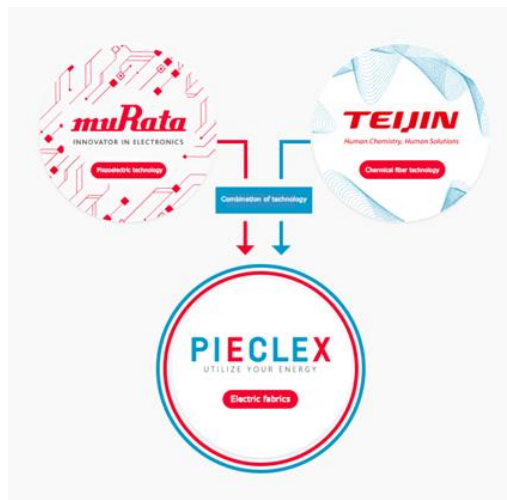


## Murata and Teijin Frontier jointly innovate fabric with antimicrobial performance

~ Establishment of a joint venture company to develop a plant-derived fabric that emits electricity, creating a better environment ~

**Osaka, Japan, June 4, 2020** --- Murata Manufacturing Co., Ltd. (Head Office: Nagaokakyo City, Kyoto Prefecture, Chairman of the Board and President: Tsuneco Murata, hereafter: "Murata") and Teijin Frontier Co., Ltd. (Head Office: Kita-ku, Osaka City, Osaka Prefecture, President Chief Executive Officer: Shinji Nikko, hereafter: "Teijin Frontier") have jointly developed the world's first piezoelectric fabric "PIECLEX" that generates electrical energy and exhibits antimicrobial performance when a motion is applied.

Also, Murata and Teijin Frontier jointly established PIECLEX Co., Ltd. (Head Office: Yasu City, Shiga Prefecture, President and Representative Director: Daiji Tamakura) on April 1, 2020 as a joint venture company for the purpose of research, development, manufacturing and sales of this fabric.



PIECLEX fabric realizes antimicrobial performance by converting motions such as human movement into electrical energy by combining Murata's piezoelectric technology cultivated through development and manufacture of electronic components with Teijin Frontier's fabric technology, which spans from yarns and materials to product manufacturing. PIECLEX also contribute to protecting the global environment as it uses plant-derived polylactic acid (PLA) as its raw material and does not apply chemical agents and organic solvents.

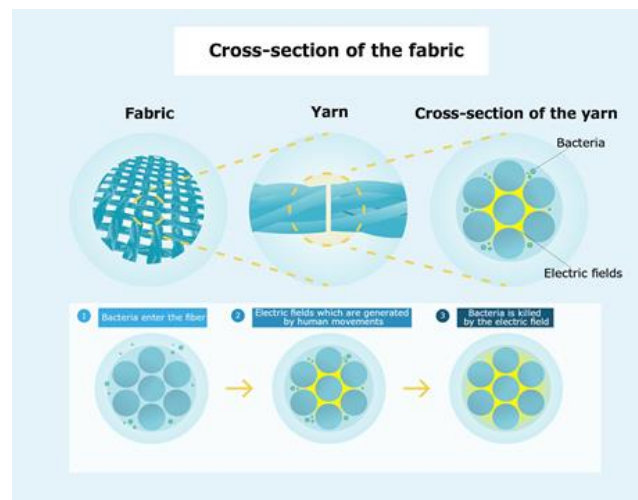
### **PIECLEX is a carbon-neutral, earth-friendly fabric**

PIECLEX uses PLA, which is produced by fermented starch extracted from plants to produce lactic acid then bonded. Since plants absorb carbon dioxide in the atmosphere and synthesize starch, PIECLEX does not increase the total amount of carbon dioxide that causes global warming.

### **Utilizes piezoelectric technology to achieve antimicrobial and deodorant(\*) functions without using of chemical agents**

PIECLEX fabric generates electricity by using the expansion and contraction of the fabric produced by human movement or other motions. This enables antimicrobial and deodorant functions without using chemical agents or organic solvents, helping to reduce the environmental load.

(\*) Antibacterial function which prevents odor generated by bacteria that decomposes sweat and sebum



Antimicrobial mechanism

### **Future development**

- (1) Going forward, PIECLEX Co., Ltd. will develop a wide range of applications of PIECLEX, from clothing products such as sportswear and innerwear to industrial products including filters and sanitary materials.
- (2) Production and sales will start from fiscal 2020, with the goal of 10 billion yen in sales by fiscal 2025.



Examples of products using PIECLEX fabric

**Murata's Chairman of the Board and President Tsuneo Murata had the following to say about the joint venture:**

"The fabric developed by the newly established PIECLEX Co., Ltd. makes use of Murata's piezoelectric technology and knowledge cultivated through products such as SAW filters, resonators, and sensors. To the present, Murata has contributed mainly in the field of electronic equipment, and I am very happy that this combination with Teijin Frontier's fabric technology will let us challenge the creation of new value in the field of fabrics. This joint venture will make the most of both companies' strengths and contribute to the creation of prosperous lifestyles through electrical fabrics."

**Teijin Frontier's President Chief Executive Officer Shinji Nikko said about the joint venture:**

"The piezoelectric fabric developed by PIECLEX Co., Ltd. realizes antimicrobial performance without using chemical agents, etc. It also contributes to environmental load reduction as it applies plant-derived raw materials. PIECLEX integrates Murata and Teijin Frontier's cutting-edge technologies, and I believe this innovative fabric will be essential for sustainable future lifestyle. By providing fabric that have never existed before, we will contribute to realize bountiful lifestyles and beautiful environment."

### Corporate overview of joint venture

Company name	PIECLEX Co., Ltd.
Date of establishment	April 1, 2020
Location	2288, Oshinohara, Yasu-shi, Shiga, 520-2393 Japan (Within the Murata Manufacturing Co. Ltd. Yasu Division)
Representative	Daiji Tamakura, President and Representative Director
Capital	100 million yen
Business description	Development, manufacture and sales of piezoelectric fabric
Investment ratio in the joint venture	Murata: 51% Teijin Frontier: 49%
Website	<a href="https://pieclex.com/">https://pieclex.com/</a> (Japanese only)

#### About Murata

Murata Manufacturing Co., Ltd. is a worldwide leader in the design, manufacture and sale of ceramic-based passive electronic components & solutions, communication modules and power supply modules. Murata is committed to the development of advanced electronic materials and leading edge, multi-functional, high-density modules. The company has employees and manufacturing facilities throughout the world.

#### About Teijin Frontier

Teijin Frontier is the world's only business entity involved in the integrated manufacture and sales of fibers. The company's wide-ranging supply chain extending from manufacture of yarns to retail development support its ability to develop highly differentiated products. Teijin Frontier creates and offers a wide range of products and services, from clothing fabrics to industrial material fabrics, which are not yet on the market.