

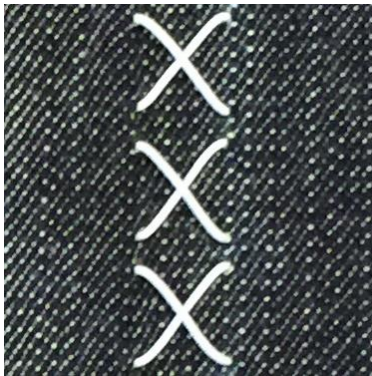


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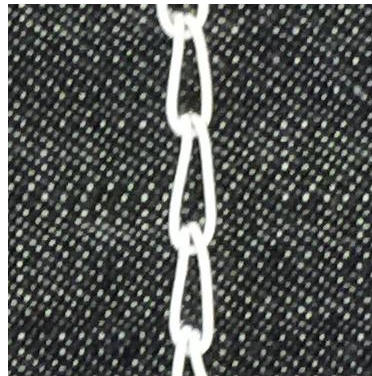
**Kansai Univ. and Teijin Develop Piezoelectric Wearable Sensors
Featuring Fashionable Stitch Designs**

Tokyo, Japan, 16 January, 2018 --- Kansai University and Teijin Frontier Co., Ltd., the Teijin Group's fiber-product converting company, announced today that Professor Yoshiro Tajitsu of Kansai University's Faculty of Engineering Science and Teijin Frontier have developed e-stitch, a series of fashionable piezoelectric wearable sensors with stitch designs that measure body motions such as extension, contraction, bending and twisting. Soft, flexible e-stitch sensors are largely unrestricted in terms of fabric types and embroidery patterns, allowing them to be produced in highly fashionable designs.

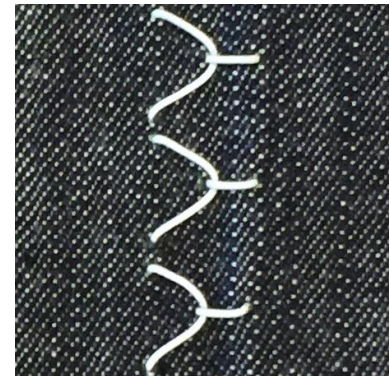
The new series is based on piezoelectric *kumihimo* wearable sensors that Kansai University and Teijin Limited announced in January 2017. For demonstration purposes, those sensors were incorporated in Japanese-style braided cords, known as *kumihimo*. The technologies embodied in soft, flexible e-stitch sensors represent a break from preconceived ideas about wearable sensors because they offer new levels of sensing convenience and fashion.



Cross-stitch
(bending)



Chain-stitch
(elongation and contraction,
twisting and bending)



Fly-stitch
(twisting)

Kansai University and Teijin Frontier will exhibit their e-stitch sensors and examples of their application at The 4th Wearable Expo (booth No. W15-5, West Hall), the world's largest exhibition of wearable devices and products, which will take place at Tokyo Big Site from January 17 to 19. The booth will showcase samples of e-stitch sensors featuring traditional designs that have been incorporated in ladies' modern denim wear made by Japanese designer Homay, the producer of Kyoto Denim clothing. Samples of e-stitch sensors incorporated in pet wear and athletic-shoe insoles also will be displayed.



e-stitch sensors used in ladies' wear

Going forward, Kansai University and the Teijin Group will continue to explore the potential of polylactic-acid (PLA). Through industry-academia collaborations, they aim to create highly added-value sensing technologies for augmented-reality applications in the Internet of Things.

Piezoelectricity is the generation of electric charges by certain dielectric materials in response to mechanical stress. Piezoelectricity also can be used to apply electric voltage to produce mechanical strain in materials. Both effects can be measured, enabling piezoelectric materials to be used for both sensors and actuators.

Kansai University and Teijin have been jointly developing eco-conscious PLA piezoelectric materials for a number of years. They introduced a flexible piezoelectric film by alternately laminating poly-L-lactide (PLLA) and the optical isomer poly-D-lactide (PDLA) in 2012, PLA fiber- and carbon-fiber-based piezoelectric fabrics in 2015, piezoelectric roll for load-dependent voltage generation and attenuation in 2016, and piezoelectric *kumihimo* wearable sensors that detect body motions such as elongation and contraction, bending and extension, and twisting in 2017.

About Kansai University

In 2016, Kansai University celebrates the 130th anniversary of its founding as one of the leading comprehensive universities in Japan. Kansai University is a prestigious private university with 13 undergraduate and 13 graduate programs along with 3 professional graduate schools. There are over 30,000 students enrolled at the university including more than 700 international students. Kansai University has graduated 450,000 students and they are participating actively in many fields around the world.

Kansai University aims to nurture top runners who can make a contribution to society, striving to present the world with new ideas and innovations, and is always dynamic and on the go.

About the Teijin Group

Teijin (TSE: 3401) is a technology-driven global group offering advanced solutions in the areas of environmental value; safety, security and disaster mitigation; and demographic change and increased health consciousness. Its main fields of operation are high-performance fibers such as aramid, carbon fibers & composites, healthcare, films, resin & plastic processing, polyester fibers, products converting and IT. The group has some 170 companies and around 19,000 employees spread out over 20 countries worldwide. It posted consolidated sales of JPY 741.3 billion (USD 6.5 billion) and total assets of JPY 964.1 billion (USD 8.5 billion) in the fiscal year ending March 31, 2017.

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