KANSAI UNIVERSITY

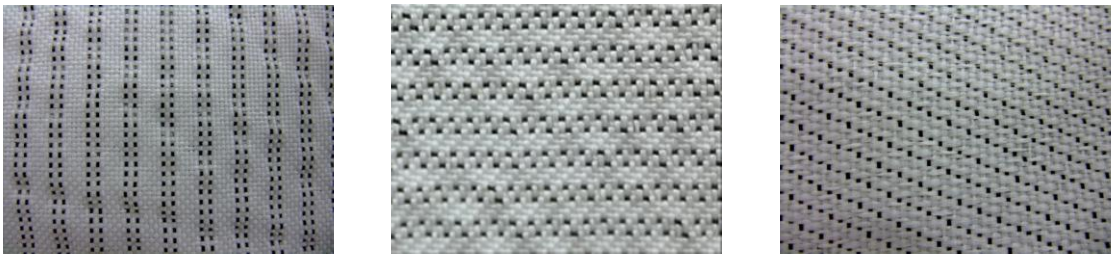
TEIJIN

NEWS RELEASE

Kansai Univ., Teijin Develop World's First Piezoelectric Fabrics for Wearable Devices

Tokyo, Japan, January 13, 2015 --- Kansai University and Teijin Limited announced today that Professor Yoshiro Tajitsu, Faculty of Engineering Science, Kansai University, and Teijin have developed the world's first polylactic acid (PLA) fiber- and carbon-fiber-based piezoelectric fabrics.

The new piezoelectric fabrics combine Teijin's polymer and textile technologies—a Teijin growth strategy to integrate key existing materials and businesses—with Prof. Tajitsu's world-leading knowledge of piezoelectric materials. Development was supervised by Prof. Tajitsu at Kansai University, with technological cooperation provided by the Industrial Technology Center of Fukui Prefecture.



New piezoelectric fabrics (from left: plain weave, twill weave and satin weave)

The fabrics comprise a piezoelectric poly-L-lactic acid (PLLA) and carbon fiber electrode. Plain, twill and satin weave versions were produced for different applications: plain weave detects bending, satin weave detects twisting, and twill weave detects shear and three-dimensional motion, as well as bending and twisting.

The sensing function, which can detect arbitrary displacement or directional changes, incorporates Teijin's weaving and knitting technologies. The function allows fabric to be applied to the actuator or sensor to detect complicated movements, even three-dimensional movements.

Kansai University and Teijin will introduce the new piezoelectric fabric (booth No. 18-11, East Hall) at The 1st Wearable Expo, the world's largest wearable devices and products exhibition, which will be held at the Tokyo International Exhibition Hall (Tokyo Big Sight) in Japan from January 14 to 16.

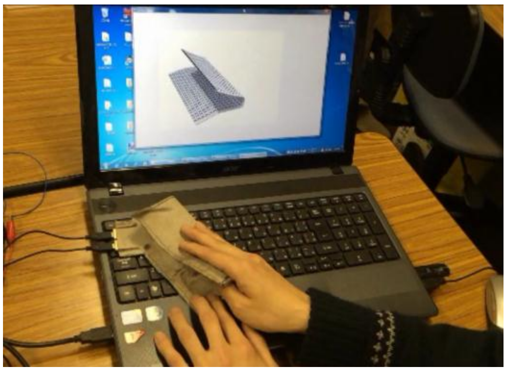
Kansai University and Teijin will continue working on ideal weaves and knits for fabric applications that enable elaborate human actions to be monitored simply via clothing worn by people. Such applications are expected to contribute to the evolution of the Internet of Things (IoT) in fields ranging from elderly care to surgery, artisanal techniques to space exploration, and many others.

Piezoelectricity is the ability of certain dielectric materials to generate an electric charge in response to mechanical stress. It also has the opposite effect – the application of electric voltage produces mechanical strain in the materials. Both of these effects can be measured, making piezoelectric materials effective for both sensors and actuators.

Lead zirconate titanate (PZT) has practical piezoelectric applications in industry, but as a ceramic material it lacks transparency and flexibility. In addition, because PZT contains lead, applications are being increasingly limited by the EU directive that restricts the use of certain hazardous substances in electrical and electronic equipment.

Polyvinylidene fluoride (PVDF) is a well-known piezoelectric polymer. However, it is limited to use in sensors and such, and it is not suited to industrial-level manufacturing because it requires poling treatment and exhibits pyroelectricity. Poling treatment, which involves applying high DC voltage to a material, is a required process for achieving piezoelectricity. Pyroelectricity is the ability of certain materials to generate a voltage and charge following a change in temperature. The existence of pyroelectricity is a very important factor in human-machine interface (HMI) applications because if a piezoelectric sensor material has pyroelectricity, then it can immediately detect heat from a finger.

In 2012, Kansai University and Teijin developed a flexible, transparent piezoelectric film by alternately laminating PLLA and optical isomer poly-D-lactic acid (PDLA). The all-new wearable piezoelectric fabric announced today is the newest application of this technology.



CAD data can immediately reflect the folding of a piezoelectric fabric.

About Kansai University

In 2015, Kansai University celebrates the 129th anniversary of its founding as one of the leading comprehensive universities in Japan. Kansai University is a prestigious private university with 13 undergraduate and 12 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 400,000 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. We strive to present the world with new ideas and innovations, and are 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 sustainable transportation, information and electronics, safety and protection, environment and energy, and healthcare. 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 150 companies and around 16,000 employees spread out over 20 countries worldwide. It posted consolidated sales of JPY784.4 billion (USD 7.7 billion) and total assets of JPY 768.4 billion (USD 7.5 billion) in the fiscal year ending March 31, 2014. Please visit www.teijin.com.

Press Contact

Corporate Communications
Teijin Limited
+81 3 3506 4055
pr@teijin.co.jp