



NEWS RELEASE

**Kansai Univ. and Teijin Develop Piezoelectric Wearable Sensors
in Japanese Braided-cord Shapes**

Tokyo, Japan, 12 January, 2017 --- [Kansai University](#) and [Teijin Limited](#) announced today that Professor Yoshiro Tajitsu, Faculty of Engineering Science, Kansai University, and Teijin have developed wearable sensors in the shapes of Japanese traditional braided cords, known as *kumihimo*, using polylactic-acid (PLA) piezoelectric fiber



From left: coaster, key holder and choker

The new piezoelectric *kumihimo* wearable sensors use the method of *kumihimo*'s technical art and can detect user motions such as elongation and contraction, bending and extension, and twisting. The softness and flexibility of *kumihimo* shapes enable the sensors to be fashioned in a wide variety of thicknesses, lengths and shapes. Other useful features include low noise, high sensitivity and solderless construction enable easy connection to devices with a small connector.



[Movie](#)

Kumihimo knotting and flexibility enable fashionable sensors to be worn as accessories, such as chokers and necklaces that detect human movements including pulse wave, swallowing or coughing.

Kansai University and Teijin will present their new piezoelectric *kumihimo* wearable sensors at [The 3rd Wearable Expo](#), the world's largest exhibition of wearable devices and products, which will take place at Tokyo Big Site from January 18 to 20. At their booth (No. W23-002, West Hall) they will unveil golf wear incorporating the piezoelectric *kumihimo* wearable sensors and a system incorporating a piezoelectric roll to minute data about golf swings. The system instantly digitalizes a golfer's movements, such as twisting and bending, without the need for markers or advanced information processing. On January 18, professional golf coaches will visit the booth and show how the data can be used to analyze golf swings.

Going forward, Kansai University and Teijin will continue to develop basic technology for their piezoelectric *kumihimo* wearable sensors. [Teijin Frontier Co., Ltd.](#), the Teijin Group's fiber-products converting company, is accelerating its development of applications for the sensors, mainly in the fields of fashion, sport apparel, interior design and healthcare, by utilizing its fashionability and wearability that conventional weaving, knitting, embroidery and braided wearable sensing devices could not reach.

Kansai University and Teijin also will continue to explore the potential of 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 environmentally conscious PLA piezoelectric materials for a number of years, including 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, and a piezoelectric roll for load-dependent voltage generation and attenuation in 2016.

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 440,000 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 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 JPY790.7 billion (USD 7.4 billion) and total assets of JPY 823.4 billion (USD 7.7 billion) in the fiscal year ending March 31, 2016. Please visit www.teijin.com.

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