



**NEWS RELEASE**

**Kansai Univ. and Teijin Develop World's First Load-dependent,  
Sustained-voltage Piezoelectric Roll**

Tokyo, Japan, December 22, 2016 --- [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 piezoelectric roll made of multilayer piezoelectric film using alternately laminated polylactic acid (PLA).



The new piezoelectric roll, which contains several  $\mu\text{m}$  PLA films wound hundreds to thousands of times, features a structure that enables load-dependent voltage generation and attenuation. It generates electric potential for up to two minutes with more than 90% of its maximum voltage when a sustainable load is applied. The new piezoelectric roll also is more flexible than conventional piezoelectric bodies, which could allow it to be used for sensors with adjustable piezoelectric duration and capabilities to physical enlargement and adjust winding numbers.

Kansai University and Teijin are now will continue working on the application development of environmentally conscious piezoelectric material to meet global demands.

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 sensors.

Lead zirconate titanate (PZT) is a material with piezoelectric properties that has practical industrial applications, but as a ceramic it lacks transparency and flexibility. It also contains lead, so applications are being increasingly limited by directives that restrict the use of hazardous substances in electrical and electronic equipment. Polyvinylidene fluoride (PVDF), a well-known piezoelectric polymer, is sometimes used as a PZT substitute, but its pyroelectricity limits such opportunities.

To date, PLA is yet to be used widely because piezoelectric directionality makes it difficult to adjust the number of layers or to enlarge its size. Kansai University and Teijin jointly developed their flexible piezoelectric film by alternately laminating poly-L-lactide (PLLA) and the optical isomer poly-D-lactide (PDLA) in 2012. They also developed PLA fiber- and carbon-fiber-based piezoelectric fabrics in 2015.

### **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](http://www.teijin.com).

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