TRI the first in the world to develop all-rubber speakers!

～slim & lightweight, with a wide sound-range, to be displayed at CEATEC～

In a world first, Tokai Rubber Industries Ltd. (HQ: Komaki City, Aichi Prefecture; CEO: Yoshiaki Nishimura) has developed an all rubber speaker - the “Smart Rubber Speaker”, which uses only rubber in the sound wave producing part.

Apart from being thinner and lighter than regular electronic speakers, the Smart Rubber Speakers have also achieved a clearer bass sound compared to conventional micro-speakers. The all-rubber-speakers are made of “Smart Rubber” (SR), which is flexible and conducts electricity, and the polymer compounds and processing techniques it utilizes are strengths of our company.

With our SR 「Smart Rubber」 technology which utilizes SR sensors, TRI continues to produce products that contribute to society, such as the Home-care assistance robot 「RIBA」, and the bedsore preventing 「SR Active Mattress」. In addition to these, incorporating the ingredients of a new pillar of SR-technology development – artificial muscle – we have developed the prototype for the all-rubber speaker.

TRI will hold a booth at a leading-edge IT electronics exposition - 「CEATEC JAPAN 2012」 - to be held at Chiba City’s “Makuhari Messe” from the 2nd-6th of October, giving live demonstrations of things such as noise-cancellers which employ this speaker.

<Features & Fundamentals>

The main feature of Smart Rubber speakers is that because the vibrating part that produces their sound is made of SR, they can produce very clear low frequency sound waves that are difficult for conventional small speakers. Also, because these speakers don’t use magnetism, they are not fitted with magnets or magnetic circuits, so they are lighter and much thinner, flexible and safe; another advantage being that you can use them anywhere.

This speaker is composed of insulation rubber sandwiched between two layers of electrode rubber, when voltage is applied to the two layers of electrode rubber, electrostatic force is created, and the membrane tries to stretch. This repetitive stretching and pulling back of the rubber towards its original position, creates sound-waves.

<Speaker Applications>

1. Ultrathin, wide frequency-range speakers.

Super thin and light at only 7mm thick, these speakers are convenient for carrying around. You can enjoy a rich sound by using them as ultrathin wide-range speakers, particularly because they can cover a wide range of pitches, including low frequencies.
② Noise cancelling.

Want to quietly enjoy Audio-Visals, or read books inside, but the noise from outside is too loud? The Smart Rubber Speakers can be used to reduce these types of frustration. By emitting sound from the speakers with the opposite-phase waveforms, noise from outside can be reduced. This function is called noise cancellation. We can already see this technology being applied to motor vehicles.

![Diagram showing sound frequency and volume comparison between Smart rubber speaker and conventional mini-speaker.]

＜Development background＞

Since TRI’s foundation in 1929, our company has utilized the high-polymer compounds and processing techniques, which have been our strength to commercialize products such as anti-vibration rubber hoses for vehicles, and plastic parts for office-automation equipment. To put our technologies to use in wider fields, what we tackled from a fundamental level was adding both flexibility and electric conductivity to rubber, and developing a wide variety of applications for it. Using this flexible and conductive material with the printing, thin-film & lamination technologies we already have, we have taken up research and development of Smart Rubber devices such as sensors and actuators.

Our company first focused on the functions of combined flexibility and conductivity, then worked on developing practical applications for sensors in products such as the Home-Care Assistant Robot 「RIBA」, the bedsore-preventing 「SR Active Mattress」, and uses for body-pressure detectors. Now, as a new use of Smart Rubber Technology, we have developed all-rubber speakers with actuator functions.

As the active technology used by the Smart Rubber Speaker, the combined flexibility and electro-conductivity in the artificial muscle material “SR” is utilized in the speakers vibrating component.
Introducing the CEATEC exhibition booth

(Note): The development of SR material is being carried out as joint research in collaboration with Kyushu University.

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