

Development of Conductive Paste for High accuracy Vital Sensing Electrodes

Tokyo, Japan –June 6, 2022 Sumitomo Bakelite Co., Ltd. (TOKYO: 4203 HQ: Shinagawa-ku, Tokyo, President and Representative Director: Kazuhiko Fujiwara) has developed a silver paste based on DuraQ[®], a highly tear-resistant silicone rubber. Joint development with Mitsufuji Corporation (Headquarters: Seika-cho, Soraku-gun, Kyoto Prefecture, President: Ayumu Mitera) has demonstrated that high-precision vital sensing with extremely low body motion noise is possible by combining a conductive cloth made of silver-plated yarn with our company silver paste.

【Development Background】

In recent years, wearable devices equipped with vital data measurement functions have appeared, which are used daily in response to changing consumer health awareness and demand. However, many wearable devices have been susceptible to noise caused by body movement, therefore it has been said that it is difficult to obtain accurate vital data.

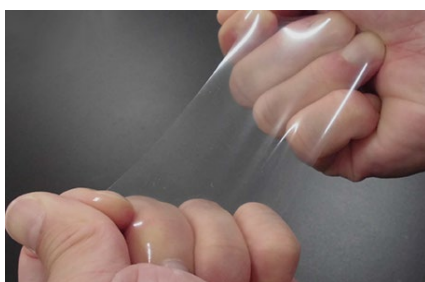
We have been developing conductive silver paste based on our original silicone rubber with high tear resistance for stretch wiring. This silver paste, which is biocompatible and can draw stretchable wiring. This stretchable circuit is wash-resistant and is attracting attention for use in wearable vital sensing. It also has good conductivity and a specific resistance of $10^{-4} \Omega \cdot \text{cm}$.

With the cooperation of Mitsufuji Corporation, we have demonstrated that the electrocardiographic waveform with extremely low noise, which could not be obtained with conventional dry electrodes, can be measured even during body movement (for example, while walking) by combining it with a conductive cloth made of silver-plated yarn.

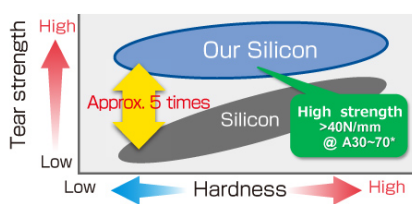
【About Developed Products】

High Tear-Resistant Silicone Rubber DuraQ[®] uses our company's original formulation technology to combine the properties of ordinary silicone rubber with a low hardness (30 A), average tear strength of 39.1 N/mm, and the world's highest level of extremely high tear strength.

Movie: <https://www.youtube.com/embed/9cxWnlKW3NQ?rel=0&showinfo=0&wmode=transparent>

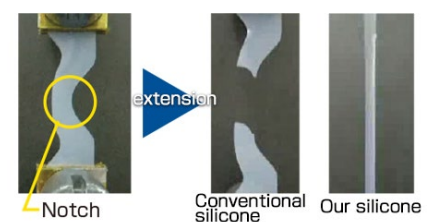


High strength in wide-range of hardness



Crack behavior

JIS K 6252

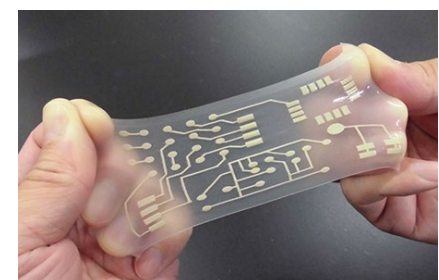


Tough, excellent in abrasion resistance, and compatible with a wide range of types with hardness from 30A to 70A, with biocompatibility. The developed product is a paste made from this silicone rubber as a base resin.

The plain type is an insulating paste, and the one mixed with conductive fine particles such as silver powder is a conductive paste.



Insulating Paste Conductive paste



Flexible Stretchable Circuit Boards

【Application as Wearable Electrocardiograph Electrode】

By using electrodes (hereinafter referred to as “new electrodes”) made by combining our company silver paste with conductive fabric made from silver plated yarn, a product of Mitsufuji Corporation, for example, as a wearable electrocardiograph, we were able to measure electrocardiogram shapes with extremely low body motion noise. Generally, to measure a valid electrocardiogram (raw, unprocessed data), the person must be quiet and immobile. For example, electrocardiography during a 5-minute walk showed only 1.6% noise with the new electrodes. Also, a high success rate can be obtained during sports.

■Actual measurement data during walking (noise 1.6%)



(Provided by Mitsufuji Corporation)

In this way, electrocardiography can be performed as raw data that is not complemented even when the body is moving. This enables continuous electrocardiography during daily life, and is expected to be used in medical applications. The new electrode has also been demonstrated to be resistant to linen washing.

【Potential application field】

- Various high-temperature environmental work such as transportation and construction sites
- Work involving stress, such as pilots, drivers, and cabin attendants
- Sports
- Medical and nursing care profession
- Automobile
- IoT, Metaverse

【about Mitsufuji Corporation】

Kyoto Head Office : 13F Keihanna Plaza 7 – 1 Chome Hikoridai, Seika, Soraku District, Kyoto

Main Businesses : Development, manufacture and sale of silver-metalized conductive fiber AGpos[®] and wearable IoT hamon[®] products

Website : <https://www.mitsufuji.co.jp/en/>

※The above measurements, figures and expressions are representative values or examples and are not guaranteed.

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