通用矽酮 GS
GENERAL SILICONES

Compo-SiL®

Applications of

Flexible Hybrid Electronics (FHE)

Contents

PART 1

About *Compo-SiL*®

General Silicones has developed a better solution for eco-friendly, sustainable, highly durable, printable, laminable and flexible ***Compo-SiL***® polymer composite substrate that comes with unlimited possibilities as an emerging material.

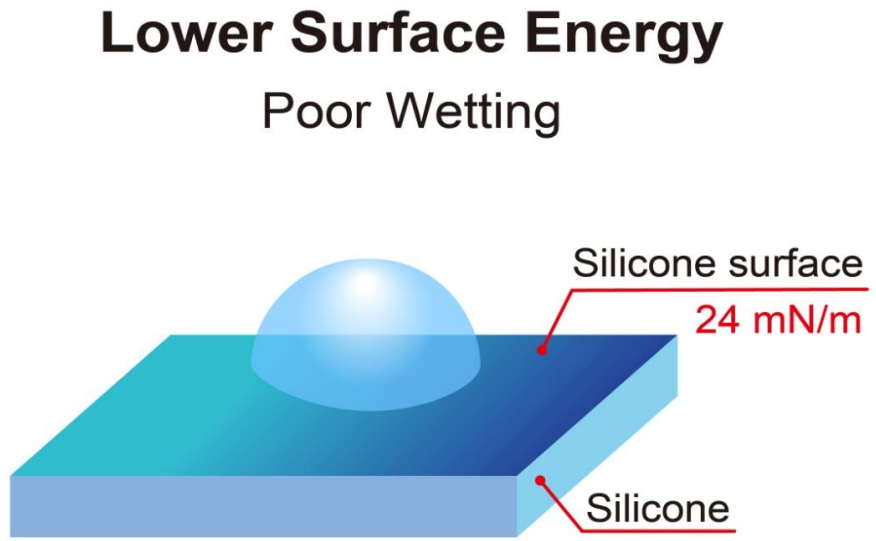
Adhesion Problems of Silicone Rubber

Silicone is one of the bio-friendly and sustainable materials . Despite that, adhesion problems of cured silicone rubber hampered mass production. The **low surface energy (LSE)** of 24 mN/m of cured silicone rubber makes it difficult to use for good adhesion.

Solid Surface	Critical Surface Tension (mN/m)
Polytetrafluoroethylene (PTFE)	18.5
Silicone	24
Poly (vinylidene fluoride)	25
Polyethylene (PE)	31
Polypropylene (PP)	31
Polystyrene	33
Poly (vinly chloride)	39
Nylon-6,6	43
Poly (ethylene terephthalate) (PET;Polyester)	43
Aluminum	~500
Glass	~1000
Iron Oxide	~1350

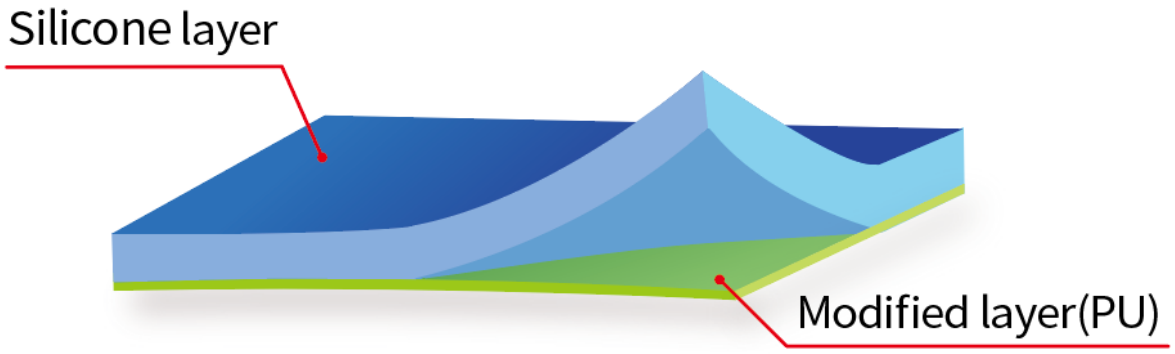
Surface energies of common substances

Ref: Adhesion and Adhesives: Science and Technology; Anthony J. Kinloch, New York: Chapman and Hall (1987)



Core Value of *Compo-SiL*®

With the patented newly silicone surface modified techniques , ***Compo-SiL***® allows the silicone materials to widely applied to various daily life products.



Property

of Silicone Layer

Highly elastic

Waterproof

Glossy surface

Highly transparent

Thermally conductive

Highly biocompatible

Weather resistance

Hydrolysis resistance

Electrically insulating /conductive

UV resistance

Property

of Modified Layer

Printable

Laminable

PU foam

High temperature resistance

Adherable

Overview of Printed Flexible Hybrid Electronic(FHE)

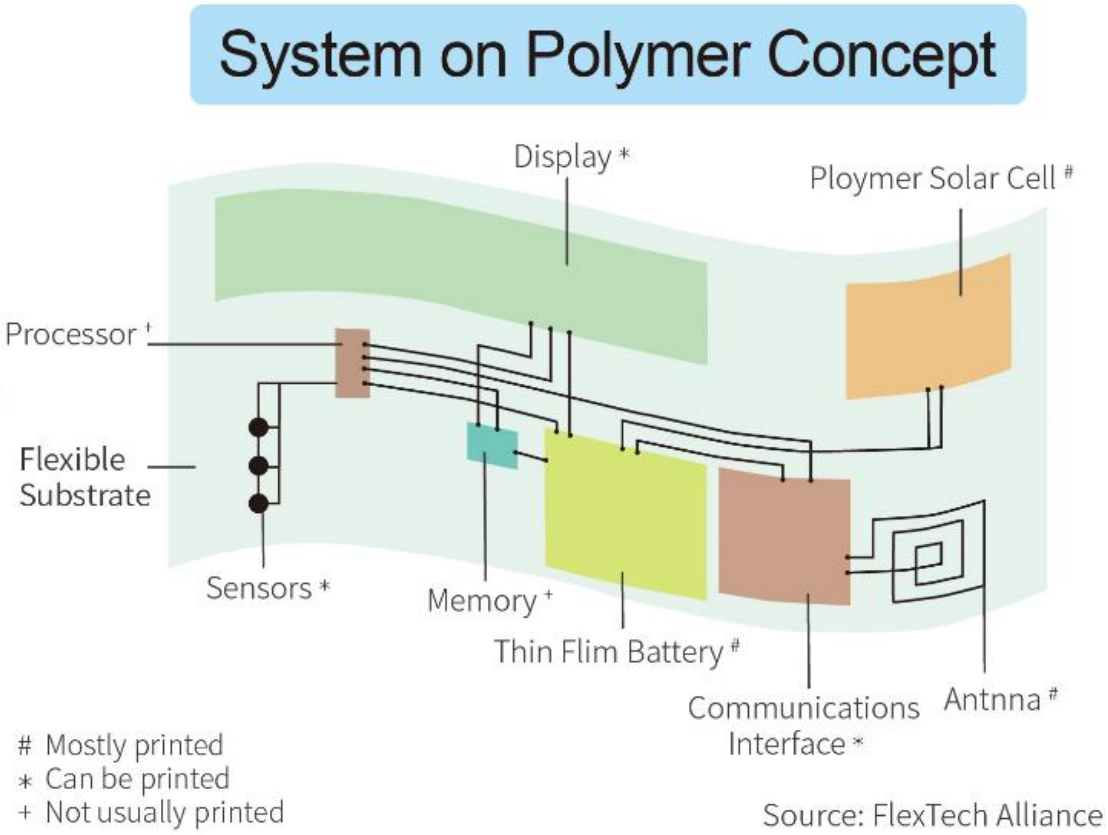
Printing

+

Compo-SiL®

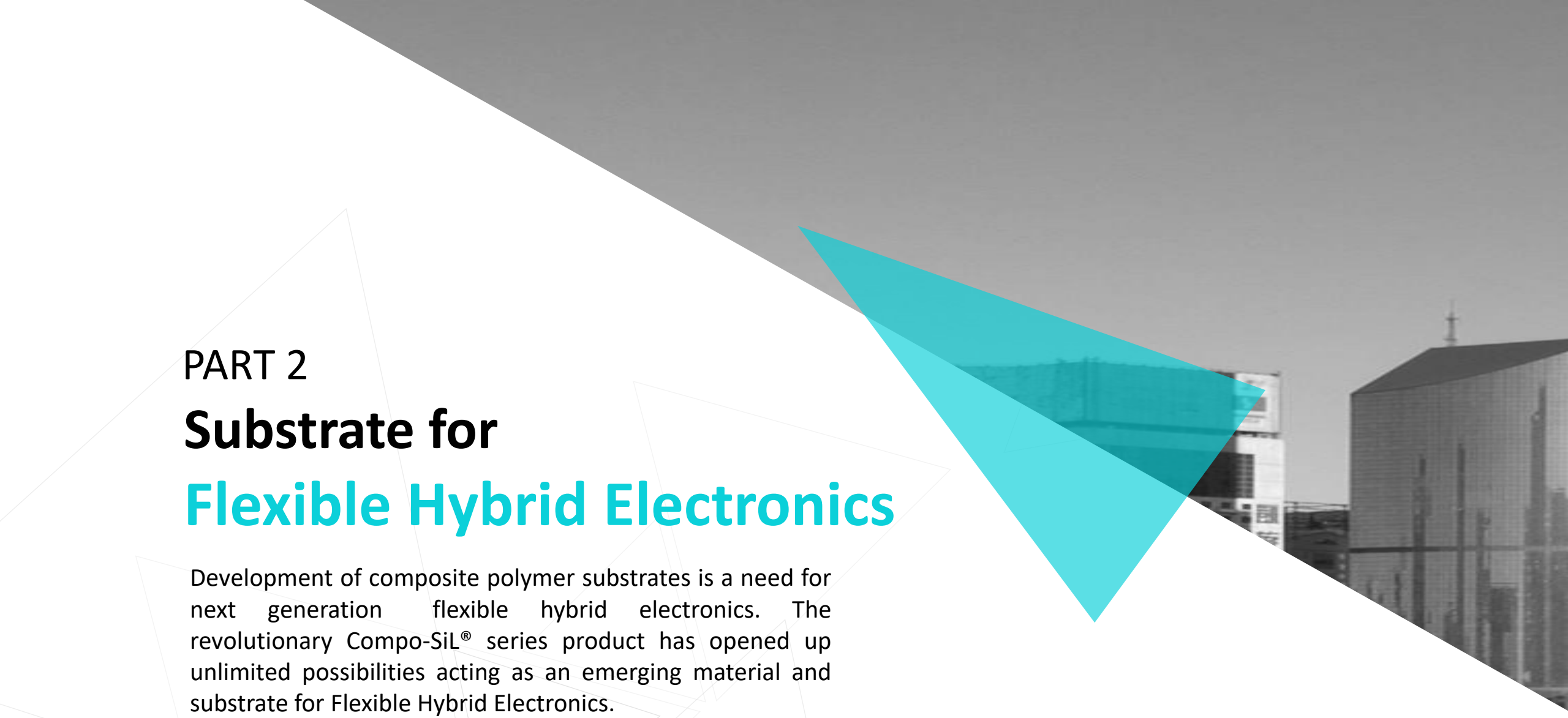
+

Electronics



Motivation for *Compo-SiL*®

- Roll to roll
- Printable
- Laminable
- Flexible/Stretchable
- Wearable (Textile & Skin)
- High Temperature Resistant



PART 2

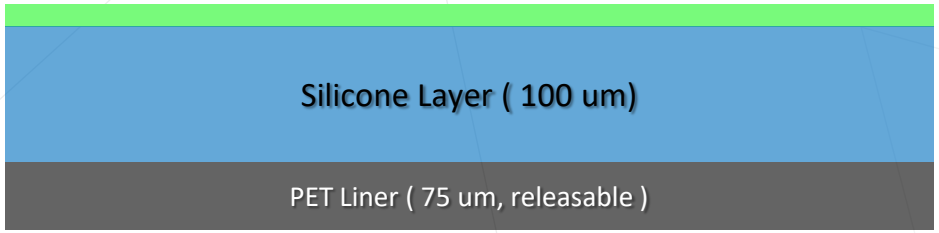
Substrate for

Flexible Hybrid Electronics

Development of composite polymer substrates is a need for next generation flexible hybrid electronics. The revolutionary Compo-SiL® series product has opened up unlimited possibilities acting as an emerging material and substrate for Flexible Hybrid Electronics.

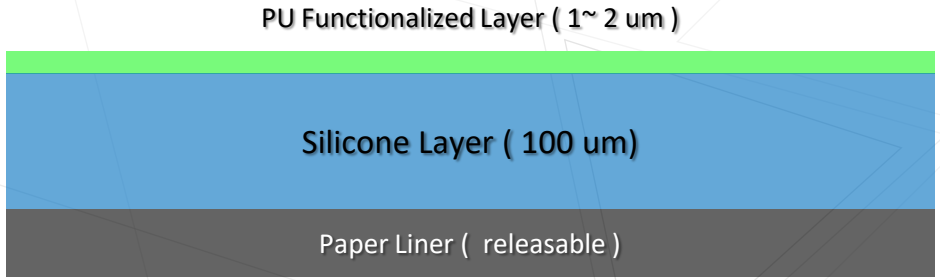
Substrate portfolio in FHE

N1051A1T10



A1020A1T20

L1050A1T10



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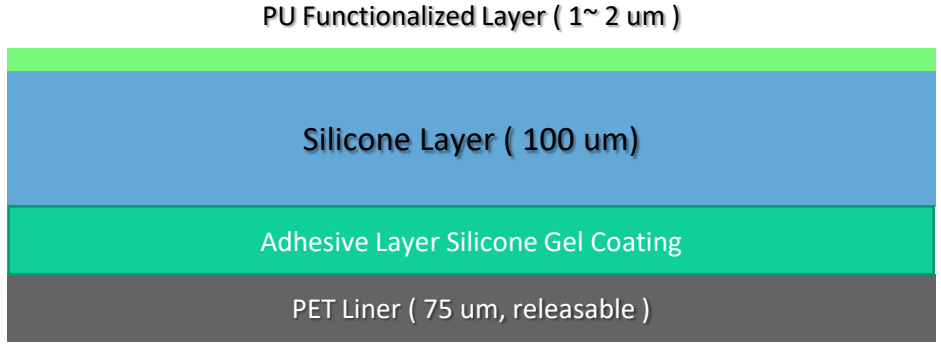
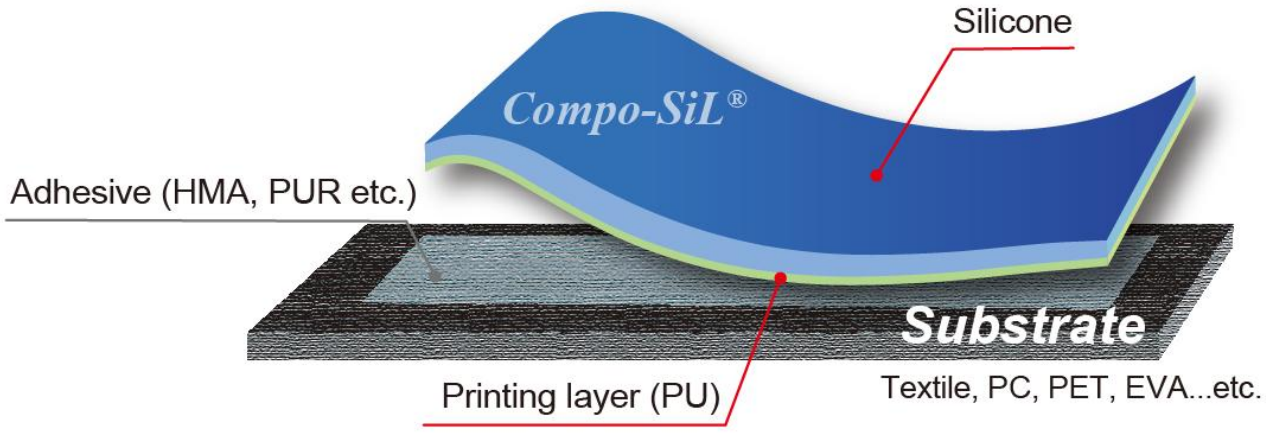
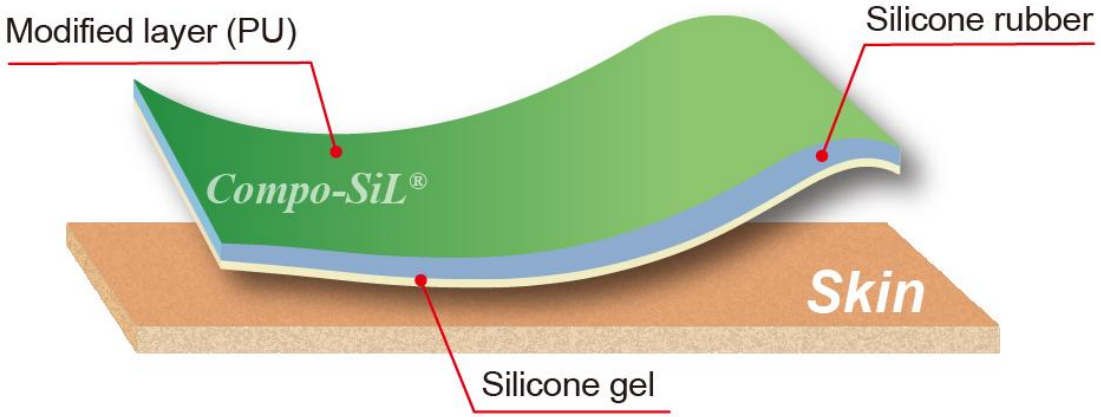


Structure

Smart Textile Applications

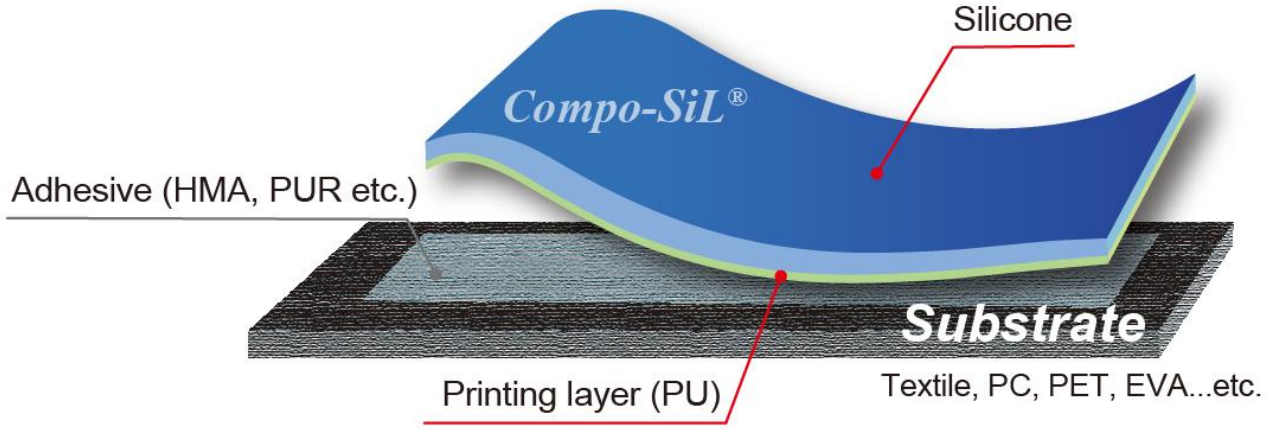


Electronic Skin applications



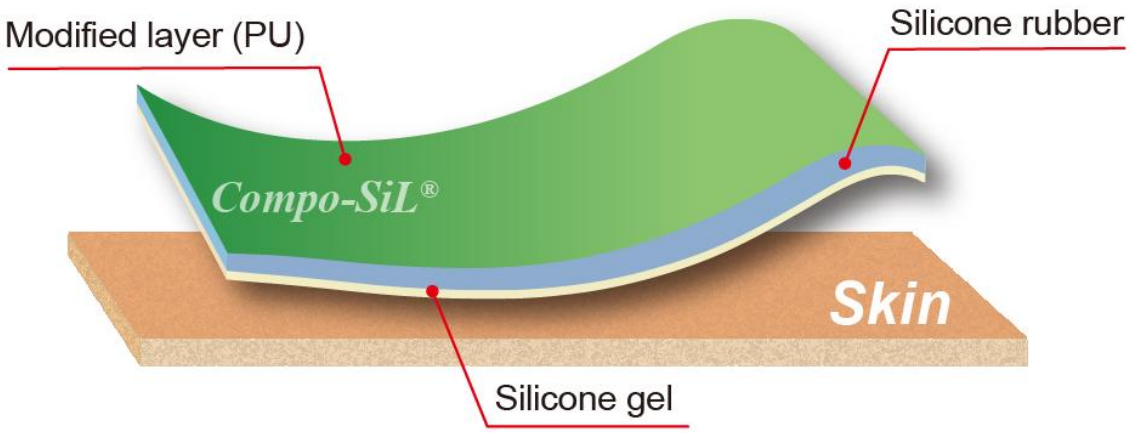
Smart Textile Substrate

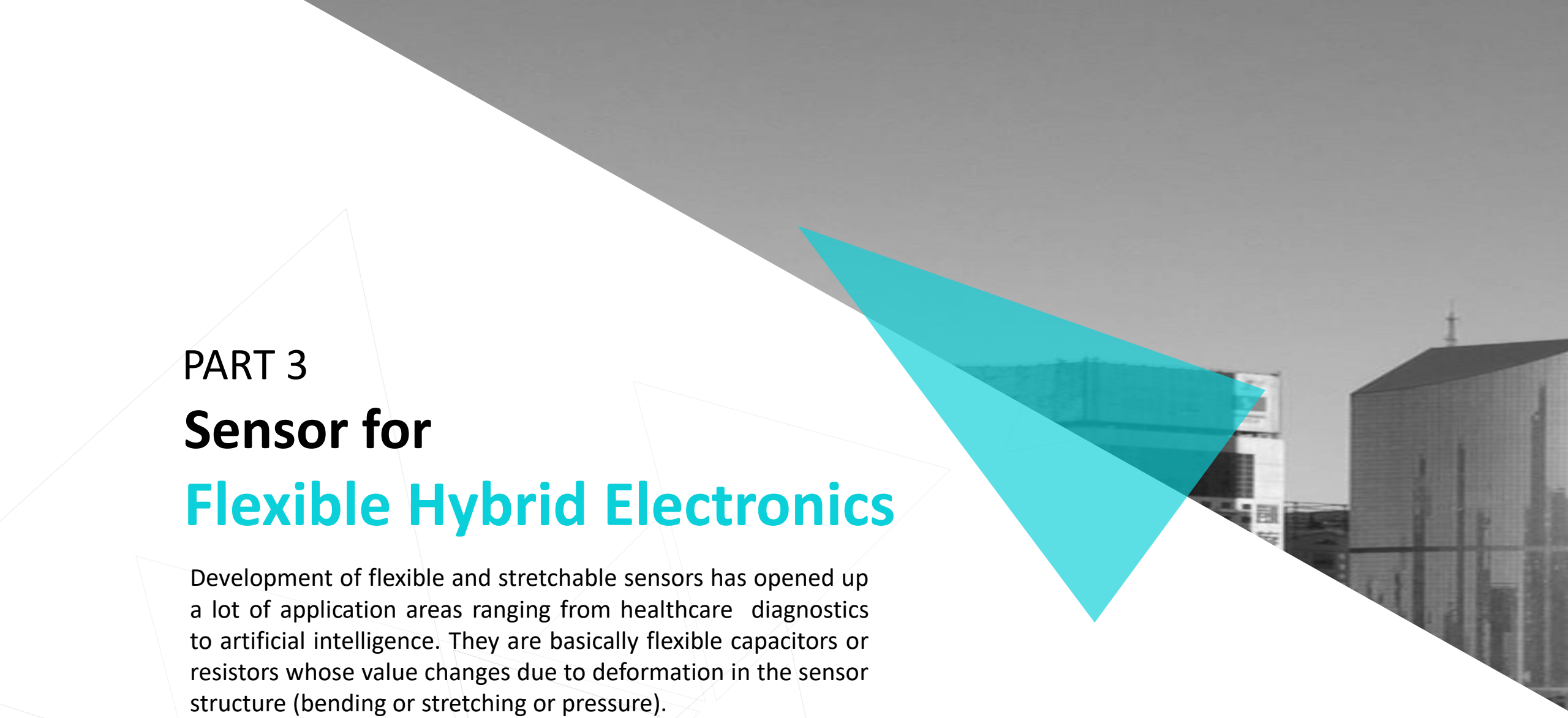
Compo-SiL® is an emerging eco-friendly substrate provides a solution of textile binding ability using HMA, printability and laminability at a same time. Having silicone along with a printable and laminable modified layer produced in a large scale roll to roll process opens up the scope of designer clothing and fashion technology.



Electronic Skin Substrate

Compo-SiL® Skin is bi-layer thin film structure that can be stuck conformally onto the surface of the skin by soft contact with great adhesion force, having a layer of medical grade reusable silicone gel creating an interface for hybrid electronic devices with seamless skin integration. It is stretchable enough to accommodate strains during natural body motion.





PART 3

Sensor for

Flexible Hybrid Electronics

Development of flexible and stretchable sensors has opened up a lot of application areas ranging from healthcare diagnostics to artificial intelligence. They are basically flexible capacitors or resistors whose value changes due to deformation in the sensor structure (bending or stretching or pressure).

☑ Gesture sensor application

Stretch Sensor
(Capacitive / Resistive)

Resistive

-Application: Bio-medical, Robotics

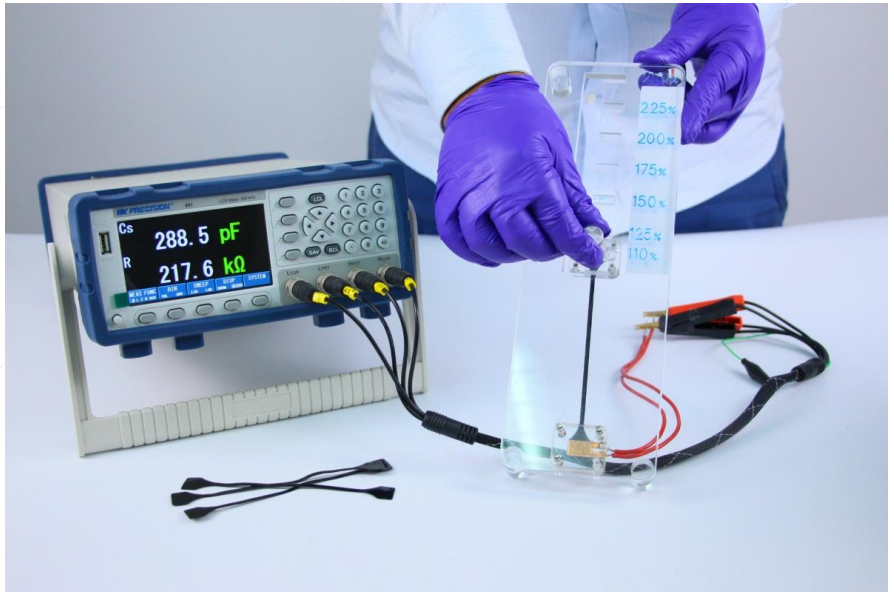
-Properties : Stretchable, Bio-compatible,

Can be attached to textile, Resilient

Capacitive

- Application: Bio-medical, Robotics
- Properties : Stretchable, Bio-compatible,

  Resilient



***Compo-SiL®*- Capacitive stretch sensor**

https://youtu.be/GXNq-i-26RU

Pressure Sensor

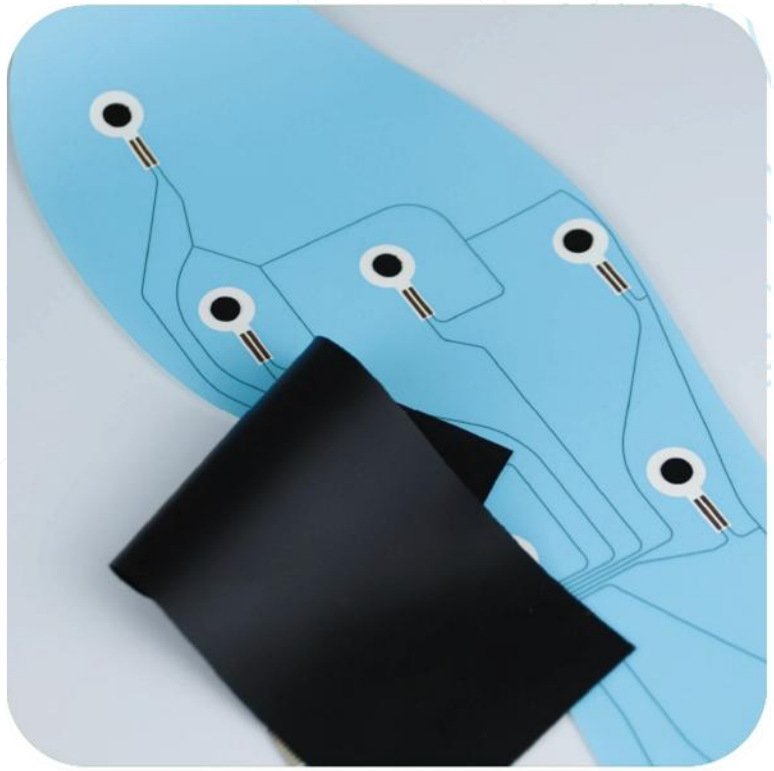
Resistive

Application:

- Medical
- Insole sensing
- Intra body pressure measurements

Properties :

-**Flexible**



PART 4

Other Applications

I. Printing on ***Compo-SiL®*** substrate

II. Conductive layer on ***Compo-SiL®*** substrate

III. Silicone as encapsulate

IV. Wearable devices

VIDEO:

https://www.youtube.com/watch?v=YFbJawiPGgM

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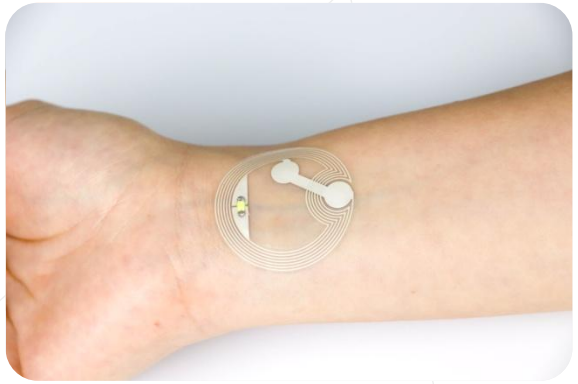
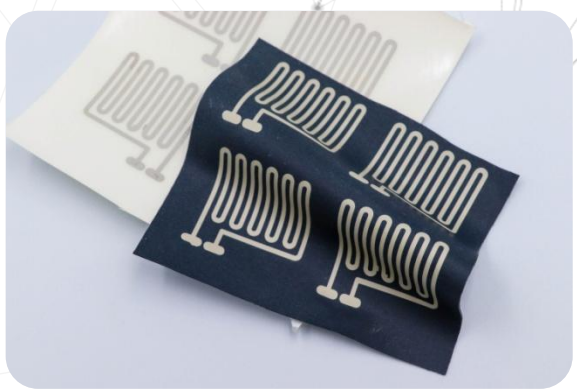
Applications



NFC Skin

Encapsulation for Circuits



Flexible Heater

RFID Circuit

LED band

Electroluminescent (EL)

Silicone Encapsulation for Circuits

Encapsulate

Application:

Wearable Electronics

Properties :

-Wearable to textile

-UV resistant

-Water repellent

-Laminable

-Washable

NFC Skin

Printed Circuit on ***Compo-SiL®*** Skin Substrate

Application:

- E-skin

-IoT

Properties :

-Bio-compatible

-Printable

-Washable

-**Reusable**

Applications

NFC skin patch printed on biocompatible silicone

IoT Applications

1. A person's identity at entrance gate
2. Data transfer between devices

Fitness Monitoring

1. Heart rate measurement.
2. Alternative to fitness bands

Medical

1. Diagnostics and monitoring patches.
2. Record Medical Information to Improve Treatment Services.

Payment

1. Without plastic ID cards, credit cards or a mobile phone

RFID Circuit

Printed Circuit on ***Compo-SiL®*** Substrate

Application:

Wearable Electronics

Properties :

-Flexible

-Helps in Product Tracking Skin friendly

Flexible Heater

Printed Circuit on ***Compo-SiL®*** Substrate

Application:

Wearable Electronics

Properties :

-Durable

-Skin friendly

-Moisture and chemical resistant

-Easily attachable to textile

Applications

Wearable printed heater based on ***Compo-SiL®***

Food Service

Automotive Seat Heating

Apparel

Healthcare

Flexible Conductive Substrate

PEDOT:PSS Coating

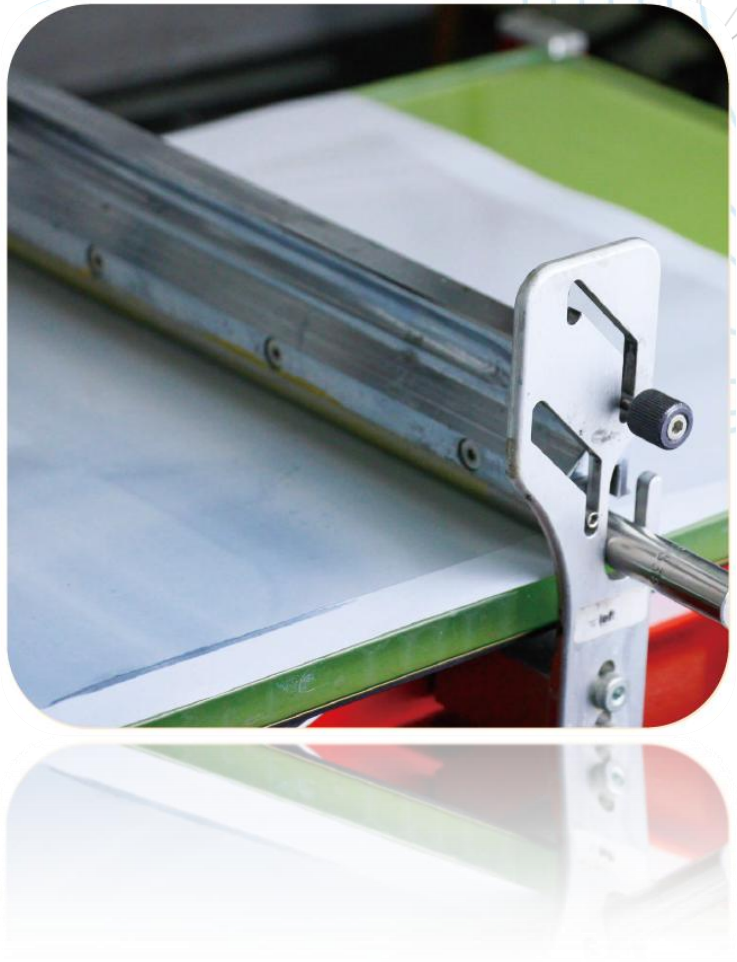
Application:

Flexible Electrode

Properties :

-Low Sheet Resistance

-Flexible and Bendable Skin friendly



Electroluminescent (EL) Device

Compo-SiL® Substrate

Application:

- Smart window

-Athletics

-Decoration

Properties :

-Flexible

-Bendable

LED band

Compo-SiL® Substrate

Application:

-Diabetic wound healing

Properties :

-Waterproof

-Thermally / electrically conductive

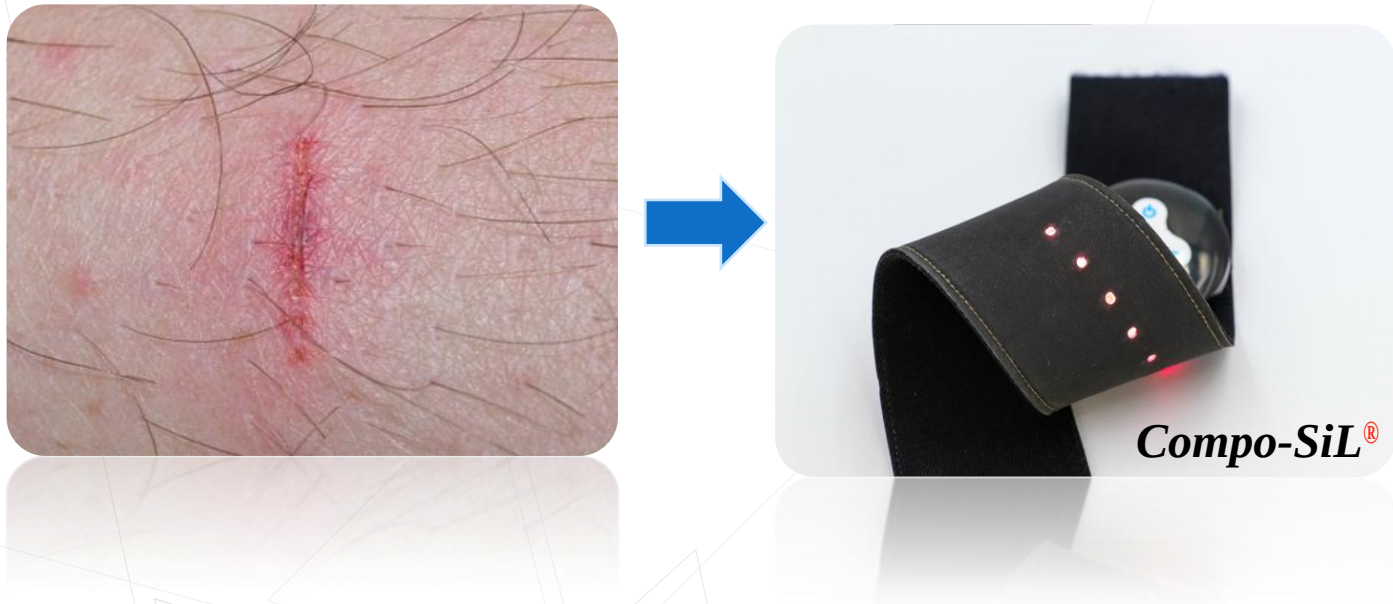
-Highly biocompatible

-Faster healing rates

-Skin friendly Bendable

Applications

Compo-SiL® **based LED band for healing wounds**



- Faster healing rates in comparison to standard methods.
- Diabetic wound treatments with 635 nm wavelength (red) light.
- Several wavelengths of light have also been used for different types of wounds.

Production Line

Roll-to-roll Production Line
1400 mm upmost width

Certifications

REACH 205

RoHS 2011/65/EU

HALOGEN

Taiwan Patent

Material ConneXion
Seal of Excellent Material

通用矽酮 GENERAL SILICONES

Q & A

Thank you for listening…

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