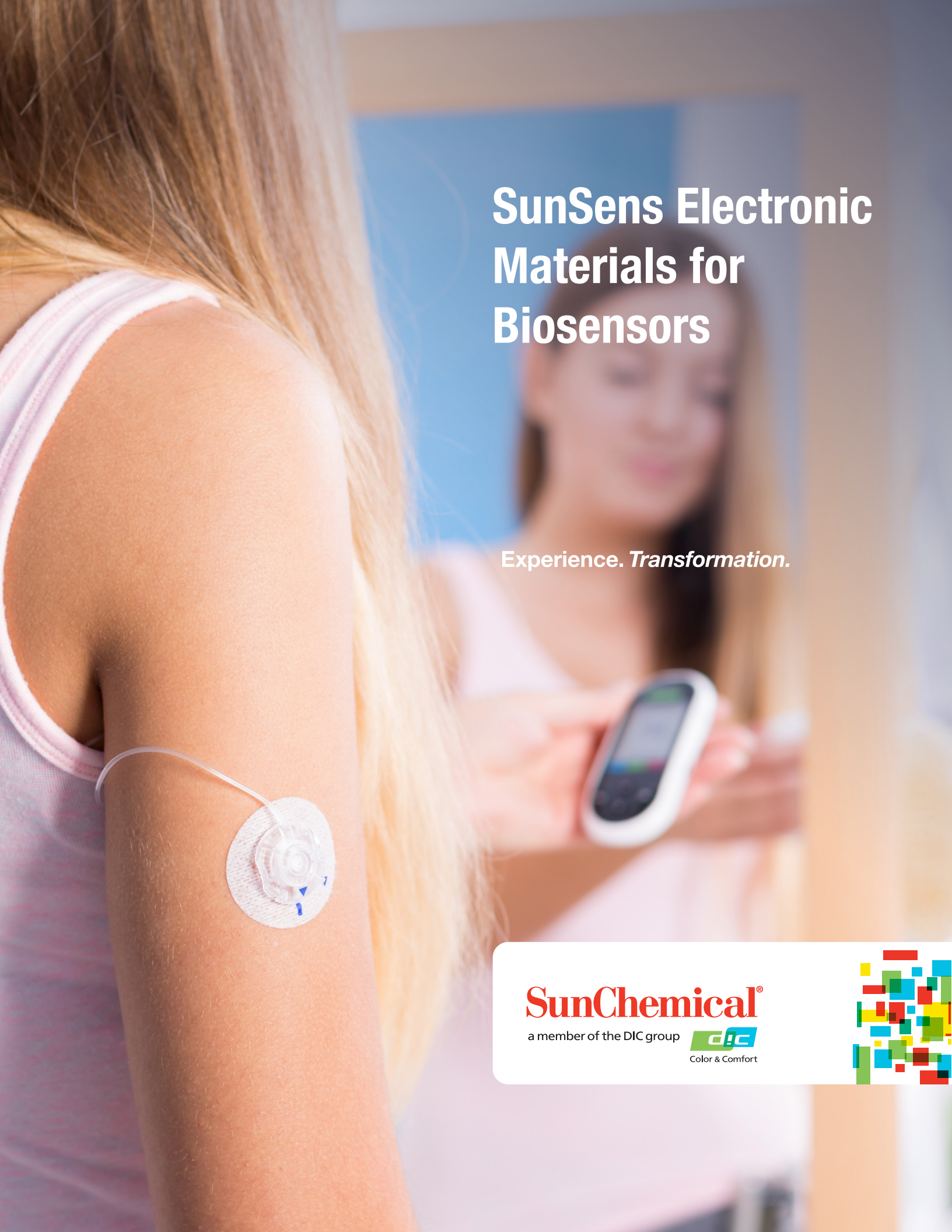


SunSens Electronic Materials for Biosensors

Experience. *Transformation.*

SunChemical®

a member of the DIC group

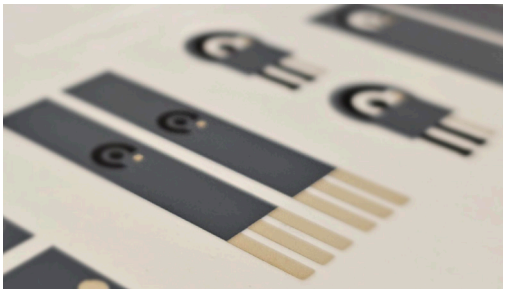
Color & Comfort

SunSens for Biosensors

The SunSens portfolio of functional inks is suitable for a range of biosensor systems that can be used in electrochemical sensors for medical, agricultural and environmental monitoring.

The range of applications extends to medical and wearable electrodes for health and wellbeing monitoring, as well as cosmetic.

SunSens products are suitable for screen printing. Materials for alternative printing processes or custom formulations are available via consultation or contract development.



The following material classes are included in the SunSens portfolio:

- Gold for Electrode Materials
- Platinum for Electrode Materials
- Carbons for Working & Counter Electrode Materials
- Mediated Carbons for Working Electrode Materials
- Silver & Silver-Silver Chloride Pastes, for Reference & Counter Electrode Materials
- Insulators & Cover Coat Materials

Platinum Electrode Materials

Screen printed platimum electrode materials from Sun Chemical are available in cross linked polymeric, standard polymeric, and high temperature varieties. Optimized for both high and low temperature substrates, Sun Chemical's platinum electrode materials are engineered for a range of electrochemical sensors and biosensors.

Paste Type	Product Code	Compatible Substrates	Primary Applications/Benefits	Normalized Sheet Resistance (Dry Film Thickness)
Low Temperature Platinum	C2050804P9	PET, PVC, PC, ceramics, Kapton	Low curing temperature platinum paste. Suitable for working, counter and reference electrodes; in electrochemical sensor applications. Used to electrochemically measure hydrogen peroxide, and can be coupled to produce biosensors, with oxidase enzymes, DNA or immunosensors.	≤ 1.85 Ω/square at 25 µm
Cross-Linking Low Temperature Platinum	C2020322P6	PET, PVC, PC or ceramic	Low curing temperature cross-linking paste for electrochemical sensor applications. Suitable for working, counter and reference electrodes. Used to electrochemically measure hydrogen peroxide, and can be coupled to produce biosensors, with oxidase enzymes, DNA or immunosensors.	≤ 320 mΩ/square at 25 µm
High Temperature Platinum	C51002P6	Alumina and ceramic	High firing temperature platinum paste. Suitable for working, counter and reference electrodes; in electrochemical sensor applications. Used to electrochemically measure hydrogen peroxide, and can be coupled to produce biosensors, with oxidase enzymes, DNA or immunosensors.	≤ 320 mΩ/square at 25 µm

Gold Electrode Materials

Sun Chemical has a range of screen printed gold electrode pastes developed for electrochemical sensors and biosensors which can be used for self-assembled monolayers in enzymatic based biosensors, and are also suitable for all forms of electrochemistry. Gold electrode materials from Sun Chemical are also ideal for immunosensors and are available in low and high temperature formulations.

Paste Type	Product Code	Compatible Substrates	Primary Applications/Benefits	Normalized Sheet Resistance (Dry Film Thickness)
Low Temperature Gold	C2041206P2	PET, PVC, PC or ceramic	Electrochemical responsive material for working electrodes. Suitable for medical diagnostics, environmental sensors and the 'agri-food' industries. Low curing temperature of 80 °C for 30 minutes. Suitable for self-assembled monolayers, DNA and Immunosensors.	≤ 80 mΩ/square at 25 µm
High Temperature Gold	C2090908D1	Alumina and ceramic	Gold paste designed for printing high definition electrodes. Ideal for working electrodes in sensors and electrode applications. High temperature firing at 700 °C for 30 minutes. Designed to remove all polymeric residues from the surface, providing an ideal surface for electrochemical purposes; including self-assembled monolayers, DNA and Immunosensors.	≤ 4 mΩ/square at 25 µm
High Temperature Gold	SGSF3257	Alumina and ceramic	Bismuth-free gold paste designed for printing high definition electrodes. Ideal for working electrodes in sensors and electrode applications. High temperature firing at 800 °C for 30 minutes. Designed to remove all polymeric residues from the surface, providing an ideal surface for electrochemical purposes; including self-assembled monolayers, DNA and Immunosensors.	≤ 6 mΩ/square at 25 µm

Carbon Electrode Materials

Screen printed carbon pastes from Sun Chemical are optimized for use on various flexible and rigid substrates, including alumina, PET, PVC, and more. These materials are suitable for working and counter electrodes in electrochemical applications. Sun Chemical carbon electrode materials can be used in conjunction with UV dielectrics and heat cure dielectrics.

Paste Type	Product Code	Compatible Substrates	Primary Applications/Benefits	Normalized Sheet Resistance (Dry Film Thickness)
Carbon/Graphite	SCST3279	Alumina, PET, PVC, Valox FR1	Good reversible cyclic voltammetric properties with ferricyanide mediator. Improved version of C2030519P4, with better screen life and print definition	≤ 60 Ω/square at 25 µm
Carbon/Graphite	C2180626D6	Alumina, PET, PVC, Valox FR1	Excellent electrochemical performance with good reversibility, when using cyclic voltammetry. Used in a variety of applications, including conductive tracks and biosensors. Provides high conductivity to sensors and biosensors.	≤ 50 Ω/square at 25 µm
Carbon/Graphite	C2130814D2	Alumina, PET, PVC, Valox FR1	Carbon paste for mass production of blood glucose biosensors. Highly conductive, provides tough printed films. Provides good flexibility and adhesion. Good impedance results from 100 kHz to 500 Hz.	≤ 10 Ω/square at 25 µm
Carbon/Graphite	C2130925D1	Alumina, PET, PVC, Valox FR1	Carbon paste for mass production of blood glucose biosensors. Highly conductive and provides tough printed films. Provides good flexibility and adhesion. Good impedance results from 100 kHz to 1 Hz.	≤ 50 Ω/square at 25 µm
Carbon/Graphite	SCST3280	Alumina, PET, PVC, Valox FR1	Good reversible cyclic voltammetric properties with ferricyanide mediator. Improved version of C2181029D1 with better screen life and print definition	≤ 70 Ω/square at 25 µm
Graphene/Carbon/ Graphite	C2171023D1	Alumina, PET, PVC, Valox FR1	Excellent electrochemical performance with good reversibility, when using cyclic voltammetry. Used in a variety of applications, including conductive tracks and biosensors. Provides higher conductivity to sensors and biosensors.	≤ 10 Ω/square at 25 µm
Graphene/Carbon/ Graphite	C2180313D1	Alumina, PET, PVC, Valox FR1	Excellent electrochemical performance with good reversibility, when using cyclic voltammetry. Used in a variety of applications, including conductive tracks and biosensors. Provides high conductivity to sensors and biosensors.	≤ 20 Ω/square at 25 µm

Mediated Carbon Electrode Materials

Screen printed mediated carbon working electrode materials from Sun Chemical are optimized for use on various flexible and ridged substrates, including alumina, PET, PVC, and more. Available in tailor made formulations, for enzyme-based technology, they are ideal for reactions involving hydrogen peroxide. These pastes are not recommended to be used in conjunction with UV pastes.

Paste Type	Product Code	Compatible Substrates	Primary Applications/Benefits	Normalized Sheet Resistance (Dry Film Thickness)
Cobalt Phthalocyanine Mediated Carbon Graphite Paste	C2030408P3	PET, PVC, PC or ceramic	This is a carbon/graphite paste which has been optimized to give superior electrochemical performance and contains cobalt phthalocyanine as mediator that makes it suitable for use with oxidase enzymes for hydrogen peroxide (H_2O_2) measuring.	≤ 60 Ω/square at 25 µm
Prussian Blue Mediated Carbon Graphite Paste	C2070424P2	PET, PVC, PC or ceramic	Used for mediated carbon working electrodes. These electrodes, when used in conjunction with specific oxidase type enzymes, enable the detection of many analytes.	≤ 65 Ω/square at 25 µm
Potassium Ferrocyanide Mediated Carbon Graphite Paste	C2070508P4	PET, PVC, PC or ceramic	Used for mediate carbon working electrodes. These electrodes when used in conjunction with specific oxidase type enzymes, enable the detection of many analytes, especially with horseradish peroxidase for hydrogen peroxide (H_2O_2) detection.	≤ 60 Ω/square at 25 µm

Reference / Counter Electrode Materials and Silvers for Underprinting

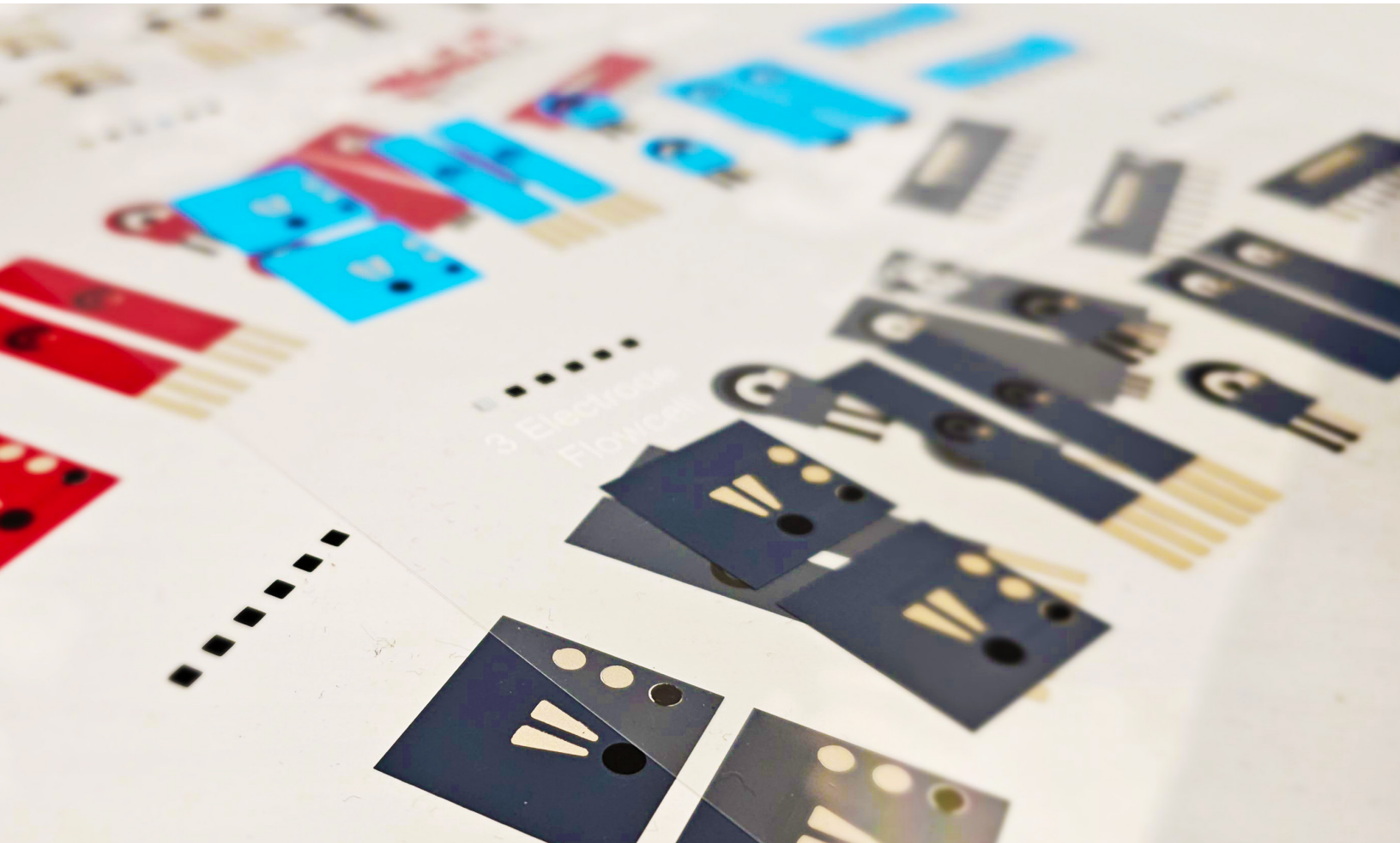
Sun Chemical provides a large range of Silver/Silver Chloride pastes. These pastes provide a consistent product with stable linear electrochemical response. Silver/Silver Chloride is available in multiple ratios of silver-to-silver chloride, from 40:60 to 90:10. Silver pastes are available for printing tracks and for underprints. Underprints can be used to lower the resistance of carbon tracks and carbon counter electrode.

Paste Type	Product Code	Compatible Substrates	Product Benefits	Primary Applications	Normalized Sheet Resistance (Dry Film Thickness)
Ag/AgCl (40:60)	C2040308P2	PET, PVC, PC, PEN, Polyimide, FR4, Alumina or Ceramic	Ratio of Silver to Silver Chloride of 40/60. Applications in medical diagnostics and environmental sensors.	Medical sensors, biosensors, EKG/ ECG, EEG and environmental Sensors.	≤ 5 Ω/square at 25µm
Ag/AgCl (50:50)	C2131007D3		Ratio of Silver to Silver Chloride of 50/50 with good reference electrode properties.		≤ 200 mΩ/square at 25µm
Ag/AgCl (60:40)	C2130809D5		Ratio of Silver to Silver Chloride of 60/40. Product offers good conductivity and electrochemical performance. Popular reference electrode used in standard electrochemical base transducers. Widely used in continuous monitoring and single use sensors; for medical. environmental and agri-food industries.		≤ 100 mΩ/square at 25µm
Ag/AgCl (60:40)	SQST3264		Ratio of Silver to Silver Chloride of 60/40. Suitable for mass production of screen printed biosensors such as continuous monitoring sensors. Provides good conductivity and electrochemical performance.		≤ 3 Ω/square at 25 µm
Ag/AgCl (60:40)	C2030812P3		Ratio of Silver to Silver Chloride of 60/40. Suitable for ECG, wearable skin patches & electrochemical sensors.		≤ 520 mΩ/square at 25 µm
Ag/AgCl (70:30)	C2090225P7		Ratio of Silver to Silver Chloride of 70/30 with good reference electrode properties.		≤ 500 mΩ/square at 25 µm
Ag/AgCl (70:30)	SQSC3258		Cross-linking Silver to Silver Chloride, with a ratio of 70/30. Providing good reference electrode properties and solvent resistance.		≤ 500 mΩ/square at 25 µm
Ag/AgCl (80:20)	C2140310D1		Ratio of Silver to Silver Chloride of 80/20. Developed to have an improved wetting and contact angle.		≤ 50 mΩ/square at 25 µm
Ag/AgCl (90:10)	C2000218P5		Ratio of Silver to Silver Chloride of 90/10. Specifically designed for ceramic substrates. Good reference electrode properties for CGM (Continuous Glucose Monitoring) biosensors.		≤ 200 mΩ/square at 25 µm
Ag/AgCl (90:10)	C60531P1		Ratio of Silver to Silver Chloride of 90/10. Provides excellent mechanical response for CGM (Continuous Glucose Monitoring) biosensors. Suitable for cosmetic & medical electrodes; and wearable skin patches.		≤ 150 mΩ/square at 25 µm
Silver	C2080415P2	Polyimide, PET, PEN, FR4, ITO, Alumina	Low cost silver paste, suitable for flexible conductive tracks, underprints and counter electrodes. Used in mass production of glucose biosensor tracks and also to print underneath carbon-graphite inks, to enhance conductivity.	Used in medical circuitry for interconnects, conductive tracks, underprints and counter electrodes	≤ 60 mΩ/square at 25 µm
Silver	C2120918P1	Polyimide, PET, PEN, FR4, ITO, Alumina	Suitable for mass production screen printed biosensors with excellent adhesion, conductivity and printing properties. Fast evaporating solvents.		≤ 20 mΩ/square at 25 µm
Silver	C2180423D2	Polyimide, PET, PEN, FR4, ITO, Alumina	Designed to provide maximum flexibility in flexible biosensors in addition to our stretch and crease package.		≤ 30 mΩ/square at 25µm
High Temperature Silver	C2050926P2	Ceramic	High temperature silver curing paste, for ceramic substrates. Suitable for print interconnects and counter electrodes for medical sensors.		≤ 3 mΩ/square at 25µm

Insulation or Cover Coat Materials

Dielectric / insulation electrode materials from Sun Chemical SunSens range can be used to define the working electrode area or to isolate conductive tracks. For UV based dielectrics, please contact a member of the Sun Chemical sales team.

Paste Type	Product Code	Compatible Substrates	Primary Applications	Additional Notes	Product Benefits
Cross-Linking White Dielectric	D2070209P6	PET, PVC, PC or ceramic	Suitable for use in normal screen printing or rotary screen-printed biosensors.	White	Excellent adhesion, chemical and environmental resistance.
Grey Dielectric	D2070423P5	PET, PVC, PC or ceramic	Suitable for defining electrode areas and forms a protective layer over the electrode tracking during immersion of the electrode.	Grey	The formulation is designed for maximum flexibility.
Cross-Linking White Dielectric	D2100824D2	PET, PVC, PC or ceramic	Used in electrochemical biosensors and other printed electronics epoxy based high dielectric constant white over coat. Suitable for large printing areas.	White	Excellent opacity, excellent insulation, and long screen life.
Cross-Linking White Dielectric	D2130510P2	PET, PVC, PC or ceramic	Used in electrochemical biosensors and other printed electronics. Epoxy based high hiding power white over coat.	White	Excellent opacity, excellent insulation, and long screen life.
White Dielectric	D2171220D2	PET, PVC, PC or ceramic	Suitable for defining electrode areas and forms a protective layer over the electrode tracking during immersion of the electrode. Used in CGM (Continuous Glucose Monitoring) sensors.	White	The formulation is designed for maximum flexibility. This paste is hydrophilic in nature.
White Dielectric	SDRT3326	PET, PVC, PC or ceramic	Used in electrochemical biosensors and other printed electronics.	White	Formulated to be printed for rotatry screen printing.
Purple Dielectric	SDST3254	PET, PVC, PC or ceramic	Purple dielectric. Used in electrochemical biosensors and other printed electronics.	Purple	Excellent opacity, excellent insulation, and long screen life.
Blue Dielectric	D2140508D1	PET, PVC, PC or ceramic	Dark Blue dielectric. Used in electrochemical biosensors and other printed electronics.	Dark Blue	Excellent opacity, excellent insulation, and long screen life.



Experience. *Transformation.*

A partner who transforms with you.

Today's environment requires more than change. It demands transformation — and a partner who's willing to transform with you. Sun Chemical, a member of the DIC group, is a leading producer of packaging and graphic solutions, color and display technologies, functional products, electronic materials, and products for the automotive and healthcare industries. Together with DIC, Sun Chemical is continuously working to promote and develop sustainable solutions to exceed customer expectations and better the world around us. With combined annual sales of more than $8.5 billion and 22,000+ employees worldwide, the DIC Group companies support a diverse collection of global customers. As you move forward into a world of stiffer competition, faster turnarounds, more complex demands and sustainable products, count on Sun Chemical to be your partner.

Sun Chemical
www.sunchemical.com | globalmarketing@sunchemical.com

SunChemical®
a member of the DIC group
Color & Comfort