Conductive Technologies INC

Certified ISO-9001:2008, 13485:2003

ELECTROCHEMICAL SENSORS

TM

THE TECHNOLOGY OF IMAGINATION

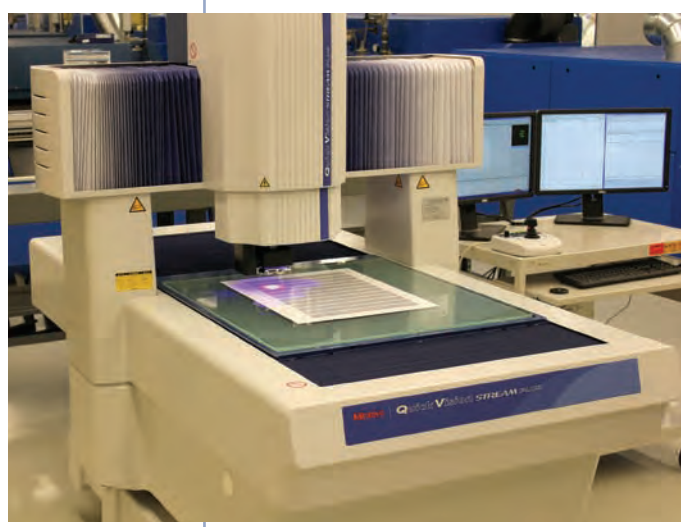
CTI CAPABILITIES

Conductive Technologies Inc., has unique access to a wealth of specialized technologies—exceptionally precise printing and processing, proprietary adhesive formulations, abilities to define and convert a wide choice of conductive and dielectric engineered materials, expertise in the properties and exact application methodologies of inks, reagents, catalysts and adhesives. These technologies make CTI one of the largest and demonstrably one of the most advanced creators of circuit-based bio and electrochemical sensors.

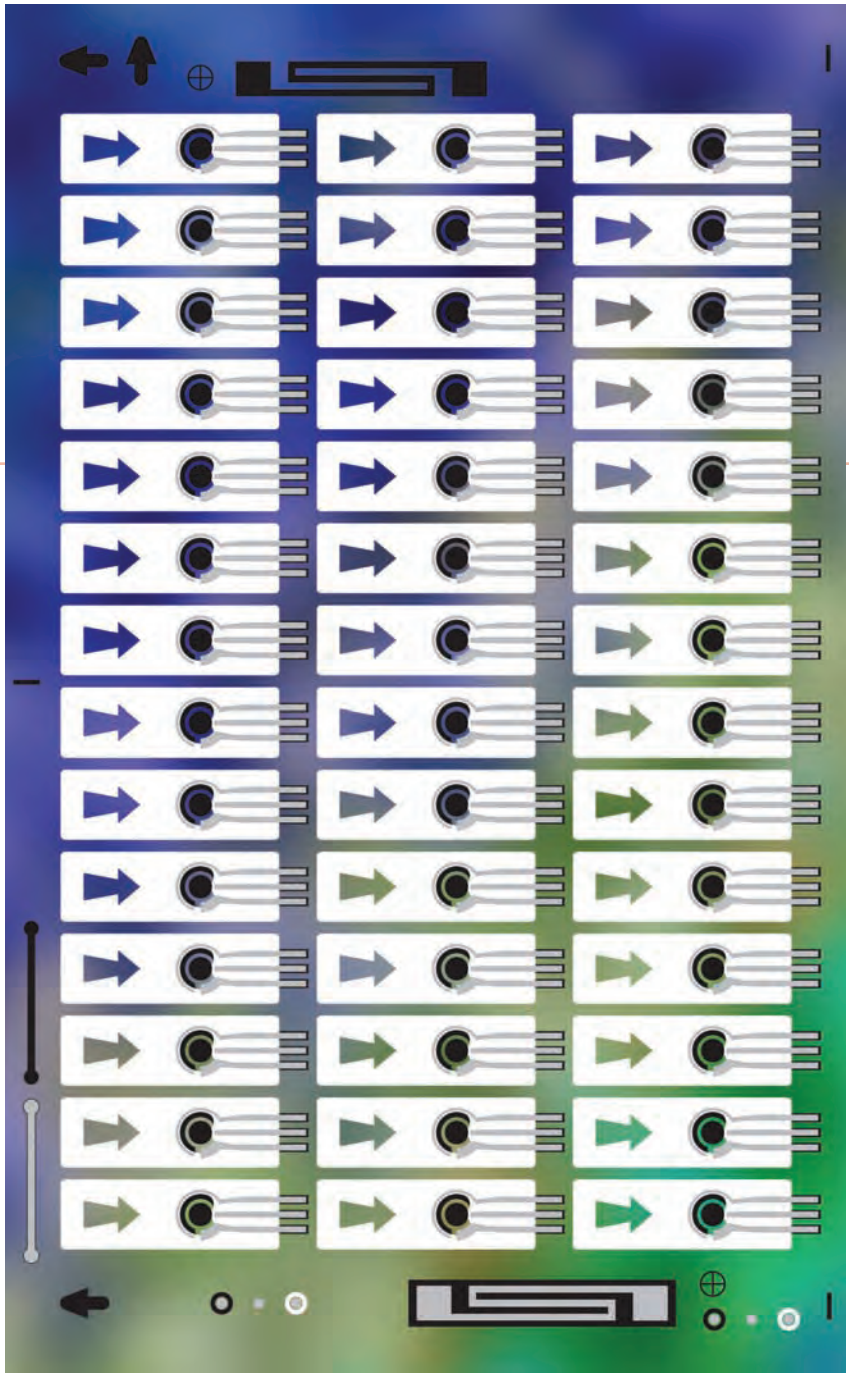
These analytic sensors incorporate a biological sensing element combined with a suitable transducer to convert biochemical events into a form of energy which can be precisely measured. These biological recognition elements may be grouped as enzymes, antibodies or bacteria. The transducers are typically of three types: electrochemical, optical and potentiometric.

CTI is a singularly capable creator of enabling systems for sensing devices.

The very latest production equipment—including such pace-setting systems as advanced, ultra-accurate, vision system die-cutting, high-speed multi-process presses, "pick 'n place" robotic assembly and digital proofing—all this and more assures realization of—and perhaps even enhancement of—the customer's expectations. From the on-line prototyping to expedited throughput to on-time and on-site delivery, CTI is the designer's choice!



Extend the limits of the possible in i-maginative interactivity.



Because most of CTI's design and our customers' applications are highly proprietary, our ability to show actual sensors is very limited. The sensor above is used to detect the presence of lead in blood—just one of the many applications for CTI sensor designs.

CTI is a singularly capable creator of enabling systems for sensing devices.

Since Conductive Technologies' conductive-based sensor platforms are—by nature—conductive, their normal function indicates deviations in either impedance, resistance or current flow. They may also register thermal reaction. Beginning with a precision registered, tuned and sensitized printed electrical circuit or a printed thermistor for sensing temperature changes, a catalyst or reagent is then introduced.

Tuned to detect specified chemicals, molecules, temperatures or toxins, this synergistic process recognizes and reacts to the presence of the biological by-product or chemical event that is desired and records it as a change in conductivity, generates an electrical signal, or causes a thermal reaction to occur.

Detection of these change-in-state events takes place within the parameters for which the customer's device is designed. To the extent of the change, the concentrations of the specified detected substances can be determined with pinpoint accuracy.

CTI is positioned to rapidly and precisely address the variations of platform designs and provide highly specialized, conductive materials to match the specified requirements imposed by the desired operation of the sensor system.

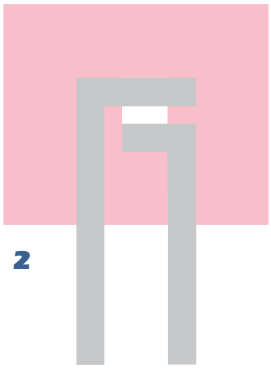
DISPOSABLE SENSORS

Every Conductive Technologies' conductive-based sensor platform is unique. Each is created in response to a singular specification to perform a very specialized function. Because the vast majority of companies for whom CTI creates sensors are involved with proprietary and innovative designs, CTI is unable to show actual sensors. The disposable sensors shown here are not real. These illustrations are designed to provide indications of how a broad selection of sensor ideas might be utilized in a range of typically specified applications.


1

1. Here, for instance, is a sensor idea for placement of multiple reagents between the working and the reference electrodes. Here, twelve different catalysts or reagents could be deposited on a single sensor. In the presence of any one of twelve different detections, a current flow or change of state would occur. An example of the analysis such a sensor can enable is detection of various chemical atmospheres within—for instance—a burning building. If one of the reagents known to be harmful is detected, an alarm could be given thus alerting fire fighters to its specific presence.

2. Here is a sample of what might function as a two electrode sensor. A reagent to detect a single event would be placed between the two electrodes. Such an event would be the detection of Ecoli toxins or blood glucose levels.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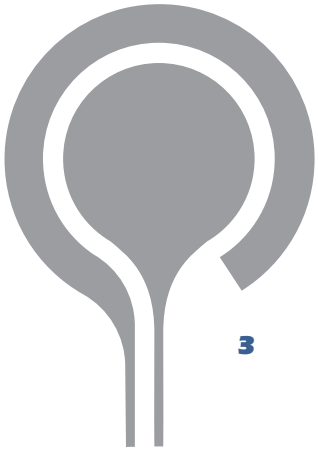
3

3. This sensor could actually enable medication delivery through iontophoresis. A drug compound would be positioned within the center electrode. By varying a potential applied across the two leads coming from the working electrode and the reference electrode, the rate at which the medication is cutaneously introduced may be accurately monitored and controlled.


4

4. Shown here is a sensor for possible use in multiple testing or in a three-lead sensor system requiring a working counter and a reference electrode.

5. This structure is a single coil heating resistor. Based upon the number of turns within the coils, different resistance levels may be obtained.


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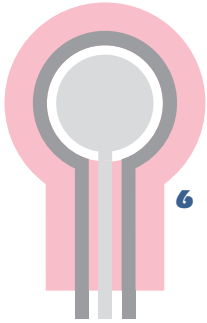
6

6. This sensor could also be employed to enable iontophoresis. It could as well enable systems using large detection molecules where very low concentrations are used and large amounts of reagent are required.

7. For something as simple as a grounding or detection pad for an EKG or an EEG, this sensor design might be specified.

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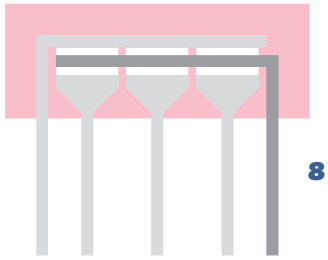
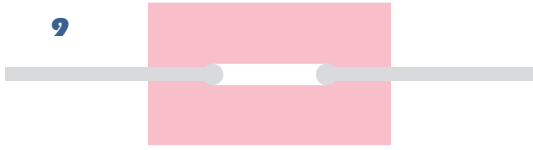


8

8. In a system which requires running a test on three different reagents or catalysts for three different detections of a single fluid, this type sensor would be indicated.

9. This electrode could be a channel within which a reaction is being enabled. By adding a cover and limiting the amount of product that could be present within the channel, a very accurate reading of a single or continuous reaction is achieved. This sensor might be specified for pure food testing.



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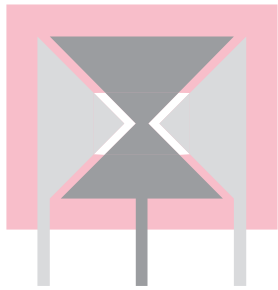
10. This is simply an example of the variety of CTI's electrode design capability. Only the imagination limits the possible configuration designs.



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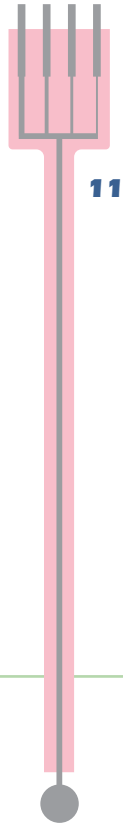
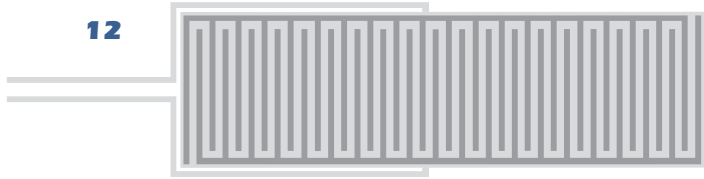


11

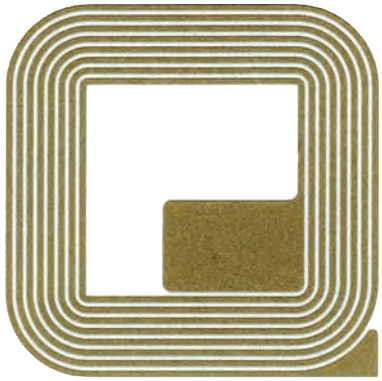
11. The precision of CTI processing is shown in this long-lead sensor featuring different reaction potentials on each of the probes. Additionally, variations in the width of the conductive traces creates a built-in resistance circuit.

12. For an entirely different application, the sensor shown below could actually function as a heating element. By introducing a source of increasing heat, the specified current-limiting conductive material of the sensor registers changes in resistance accordingly and finally reaches a stable state at which the temperature would no longer increase. Such a sensor design is indicated for systems designed to warm to a specified degree intravenously delivered fluids or to warm fluids for future processing.



12

13. This sensor is essentially a Radio Frequency Identification (RFID) antenna tag enabling a wide variety of "smart card" security and detection applications including—for example—ATM cards, transportation tickets, drivers' licenses, passports and many other data communications functions.



13

Conductive Technologies provides precision printing of conductive materials to meet a variety of customer requirements. High definition printing with various line widths with equal line spacing is one of these examples. It is often important to have the smallest possible electrode system so that the minimum amount of test material is required. There is always a trade-off as to percent variation on the smaller traces, but the following list is an example of what can be done by CTI and their expert craftsmen.

LINE WIDTH

LINE TO LINE CENTERLINES
.010" .020"
.020" .040"
.030" .060"
.040" .080"

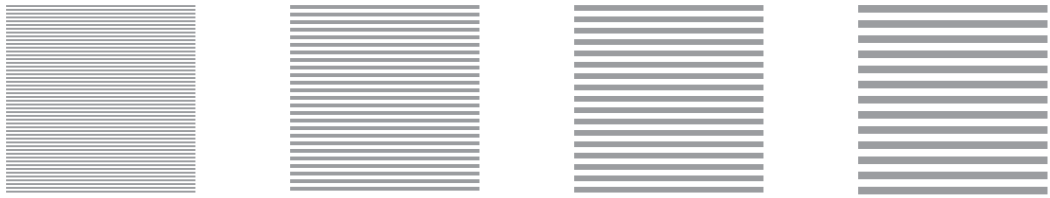
SUBSTRATES

Substrates that CTI has used or is currently evaluating are:

Polyester	Clear or White	.005" – .010"
Polycarbonate	Clear or White	.005" – .020"
Polystyrene	Clear	.015" – .070"

CTI will try to use standard materials whenever possible. There are, however, applications where special or customer supplied materials are used and they will be handled as required.

INKS



0.010" on 0.010" 0.020" on 0.020" 0.030" on 0.030" 0.040" on 0.040"

DRAWINGS

- Drawings are typically e-mailed or sent in showing the dimensions and sensor layout or layouts. If possible, the customer supplies detailed dimensions.
- It is feasible, during early research, to have several sensor designs printed on the same sheet. This allows customers to evaluate several designs during initial testing and help identify which design or designs to pursue.

Conductive inks that CTI has used or are currently evaluating are:

- Carbon
- Carbon/Silver Blend
- Silver
- Silver/Silver Chloride
- Gold
- Platinum
- UV Cured Dielectric
- Heat Cured Dielectric
- Specialty

The majority of conductive inks employed by CTI are currently being created for CTI by DuPont Corporation, either as standard products or custom blended to assure realization of any application.

Conductive Technologies will, however, manufacture components using any materials recommended or specified by customers. In some cases the customer will specify or recommend ink from other ink manufacturers. In cases where inks are not locked in, CTI will recommend an equivalent DuPont material. In cases where an exact equivalent is not available, DuPont is willing to generate special mixes and compatible systems to meet our needs.

REAGENT INKS

Reagent ink components must be specified by the customer. Due to non-disclosure agreements in place with several customers, CTI will not help in the formulation of reagent inks. After the components and percentages are determined, the customer can work with CTI for the mixing.

CTI sensors are circuit-based bio or chemical recognition instruments which convert biochemical activity into measurable energy events.

DESIGN

Designs of products vary greatly from company to company. Currently consistent print quality is achievable at .010" for a single entity or .015" lines on .015" gaps. We are working with different screen meshes and emulsions and have achieved .010" lines on .010" gaps, and additional testing on the fine line printing continues.

TOLERANCES

Print to print	±.005"
Print to die cut	±.015" typical.
	±.005" with hand tooling

PARTNERSHIP AND CONFIDENTIALITY

Due to the proprietary and innovative nature of both CTI components and products that enable and activate your end use designs, CTI technology should commonly be specified in the initial stages of design, and we welcome the opportunity to participate as your partner, facilitating a smooth integration of our products and services into your own, in the most efficient and economical manner.

Competition and the unique proprietary nature of our products, when combined with the high level of innovation of your system designs, dictates that we readily prepare and enter mutual consent Confidentiality Agreements that become part of this partnership.

CTI stands ready to assist in every way to assure that this partnership is beneficial to both parties' prosperity and progress, and we will tailor such agreements to the specific conditions and restraints that our customers deem necessary, ensuring your confidence and loyalty.

OUR MISSION

We shall reach and maintain our goal of complete customer satisfaction through the challenge of continuous process improvement. It shall be our commitment to satisfy every one of our customers through the participation and active contribution of everyone at Conductive Technologies on an ongoing basis.

Continuous process improvement brought about by the daily participation of each of us shall assure the financial strength and technical leadership position of conductive technologies into the future.

It shall be by meeting our challenge and pursuing our goal on a daily basis that we will best serve our customers, our community and each other.

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935 Borom Road

York, PA 17404

Voice: 1-800-706-0618

Voice: 1-717-764-6931

Fax: 1-717-764-3470

www.conductivetech.com