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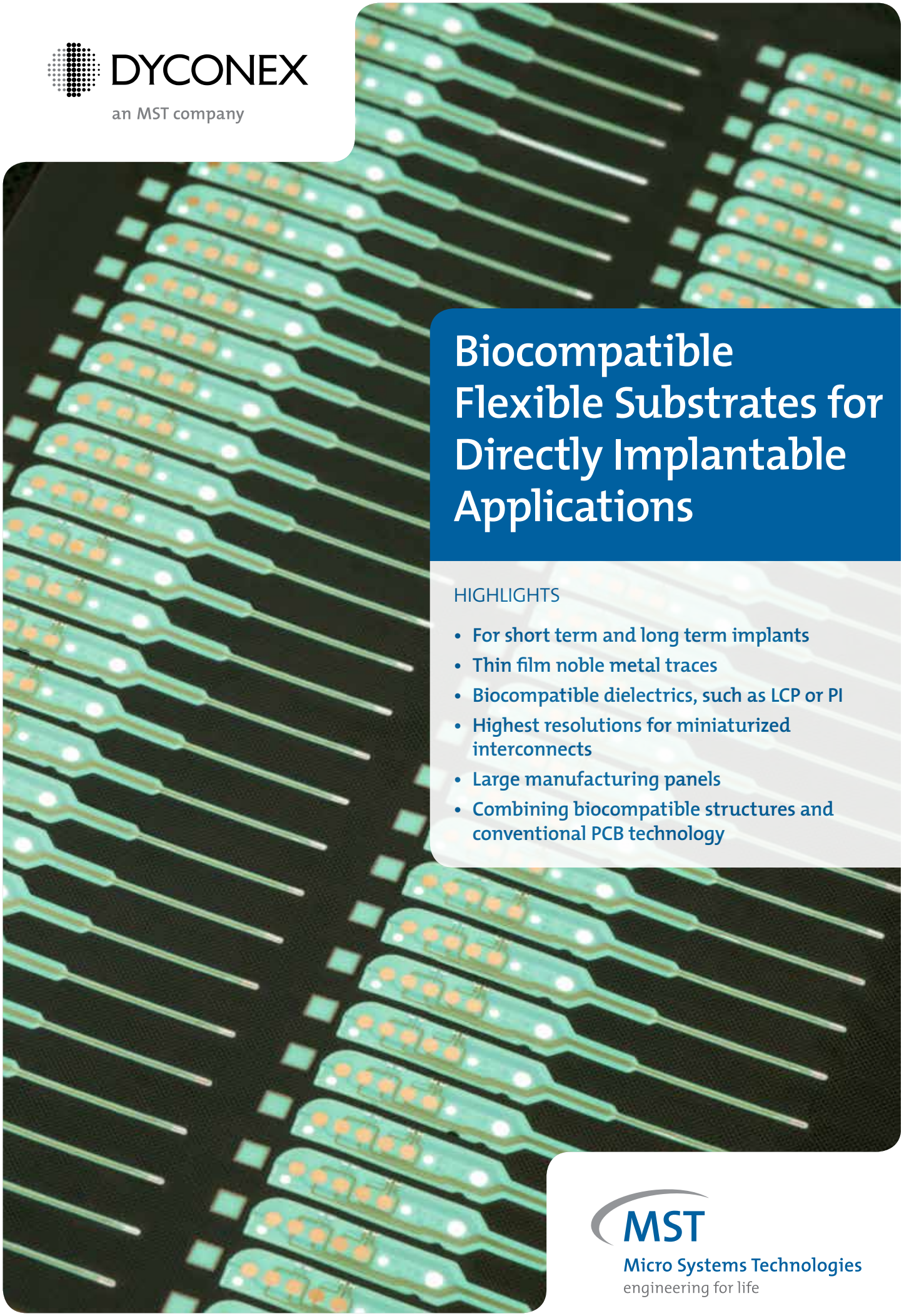

Biocompatible Flexible Substrates for Directly Implantable Applications

HIGHLIGHTS

- For short term and long term implants
- Thin film noble metal traces
- Biocompatible dielectrics, such as LCP or PI
- Highest resolutions for miniaturized interconnects
- Large manufacturing panels
- Combining biocompatible structures and conventional PCB technology

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Biocompatible Flexible Substrates for Directly Implantable Applications

Biocompatible dielectrics with embedded noble metal conductors provide a fully biocompatible platform for applications such as diagnostics, neurostimulation, implantable electrodes, catheters, sensors and actors.

Applications

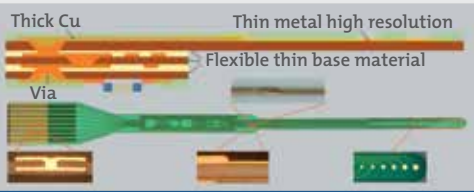
SHORT TERM IMPLANTS (<30 DAYS)

Catheters, blood glucose sensors, etc.

Hybrid buildup

Standard Copper based PCB technology for electronics

Biocompatible materials and conductors for implanted part



LONG TERM IMPLANTS (>30 DAYS)

Leads and electrodes for neurostimulation or cochlear implants, etc.

Fully biocompatible flexible structure

Gold traces embedded within LCP

Electrodes connected with vias to inner traces

Various surface coatings available (Pt, PtIr, IrO_2 or Ti)

Technologies

BIOCOMPATIBLE BASE MATERIALS

LCP (Liquid Crystal Polymer), PI (Polyimide), Glass

The properties of LCP are especially capable for direct implantables:

Very flexible thermoplast; can be transfer molded to various shapes

Fully biocompatible according to ISO 10993-5 (in vitro cytotoxicity)

Near-hermetic due to very low water absorption (< 0.04%)

Temperature stable up to 190°C; density: 1.4 g/cm³

Production panel size of 18" x 12" enables large substrates

NOBLE METAL TRACES

Conductor material consists of pure gold

Minimum line width: 15 µm

Minimum spacing between traces: 10 µm

Conductor thickness: 0.3 to 10 µm

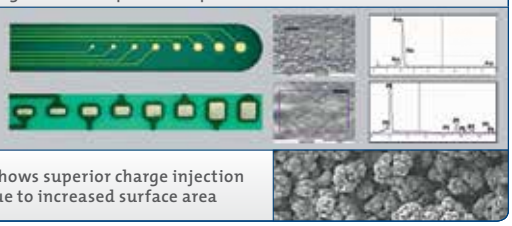
Line resistance: 0.1 to 1 Ω/cm

Resistance shows linear temperature coefficient and can be used to measure temperature in-vivo

ELECTRODE SURFACES

Electrode surface coatings: Pt, PtIr, IrO_2 or Ti

Surface coatings are electroplated or sputtered



PtIr surface shows superior charge injection into tissue due to increased surface area

OTHER SUBSTRATE CHARATERISTICS

Conductors are fully embedded in biocompatible dielectrics

Electrodes can be recessed or raised to the polymer surface

Minimum substrate thickness: 50 µm

Glue-free buildup with LCP base material

Tape test in accordance with IPC-TM-650 2.4.1 and bending test to verify thin film adhesion

Final cleaning operations to ensure biocompatibility

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Based in Switzerland, DYCONEX has been in the PCB business for 50 years and delivers leading-edge interconnect solutions in flex, rigid-flex and rigid technology. DYCONEX core competence lies in the production of highly complex HDI, high-frequency and high-reliability circuit boards for medical, defense, aerospace, industrial and semiconductor applications. DYCONEX is an MST company.

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