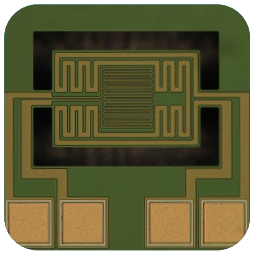
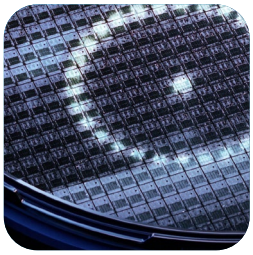
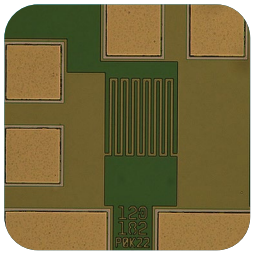
innovative
Sensor
Technology

Pt-on-Si TECHNOLOGY

Platinum precision at MEMS scale, enabled by platinum-on-silicon platform technology







Si

physical · chemical · biological

AEROSPACE | APPLIANCE | AUTOMATION | AUTOMOTIVE | BIOTECHNOLOGY

Silicon-based temperature sensors

Temperature measurement companies are being asked to do more in less space. Datacom modules, medical instruments, optical lenses and lasers, semiconductor testing equipment and precision control loops need sensing elements that shrink without giving up accuracy or long-term stability. Ceramic platinum elements deliver the accuracy but are limited in miniaturization; NTC thermistors deliver the size but not the stability or interchangeability. iST's Pt-on-Si platform is the third option – reliable platinum thin films deposited and patterned on silicon substrates using established MEMS process flows.



Excellent test results show long term stability of long-term drift reduction from GEN0 to GEN0.1

At a glance

- Resistances up to 5 kΩ on a chip area of just 0.25 mm^2
- Showcase sensor footprint 0.5 × 0.5 mm^2, with further miniaturization potential
- Any size, any thickness, any shape — defined by silicon etching
- Platinum thin-film stability, demonstrated over 10+ years
- Multiparametric measurement: e.g. heater and sensor combined on a single chip
- Semiconductor-grade repeatability from prototype to high volume

The Pt-on-Si platform

At the core is a standard, qualified process flow for depositing reliable platinum layers on silicon substrates. Around that core, iST adds standard MEMS process steps as each application requires – so customization happens on a proven foundation rather than in an experimental one.

Customer benfits

- Hi-rel Pt-on-Si process flow
- Robustness
- Design freedom for new applications
- Scalability
- Miniaturization and high volume

Characteristics

- Thin, fast, flexible
- Any size, shape and thickness

Applications

- PTCs
- Datacom
- Medical

Showcase 1

BondSens Si: iST's smallest PTC sensor

Miniaturized Pt-PTC on a 0.5 × 0.5 mm² silicon chip

Challenge

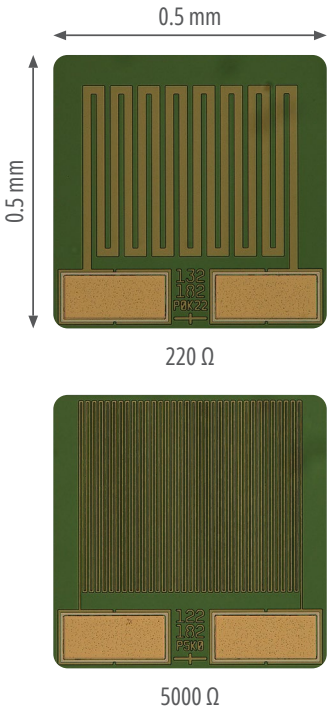
Make a platinum temperature sensor smaller, with better price performance – a genuine third option between the Pt ceramic element and the NTC.

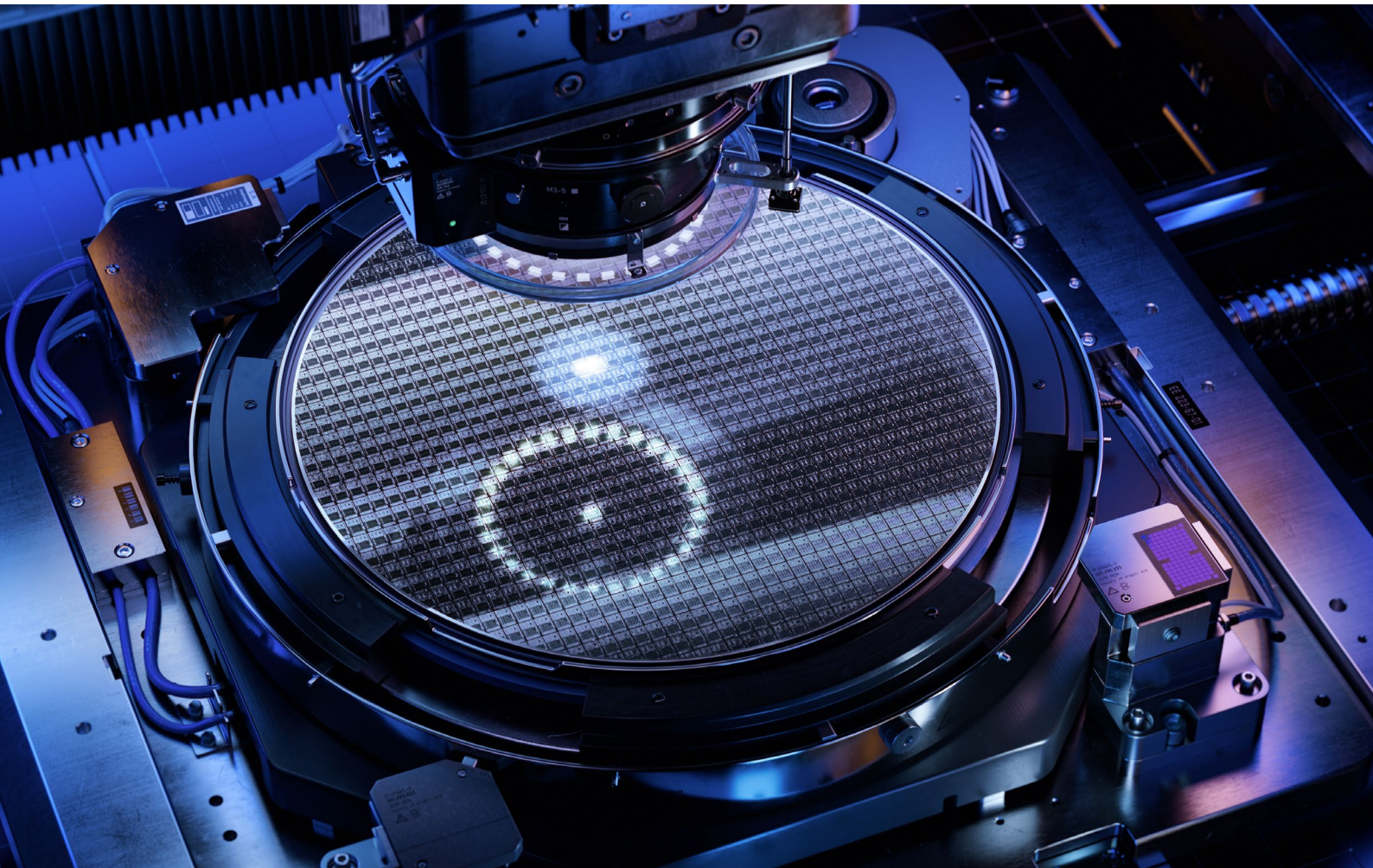
Solution

A silicon-based chip suited to both small and large volumes, with miniaturization beyond 0.5 × 0.5 mm² available. Nominal values of 220, 1000, 2000 and 5000 Ω.

Benefits

Low design effort with platinum thin-film performance. New options for chip-on-board temperature measurement, where the sensor sits directly on the board next to the components it monitors.

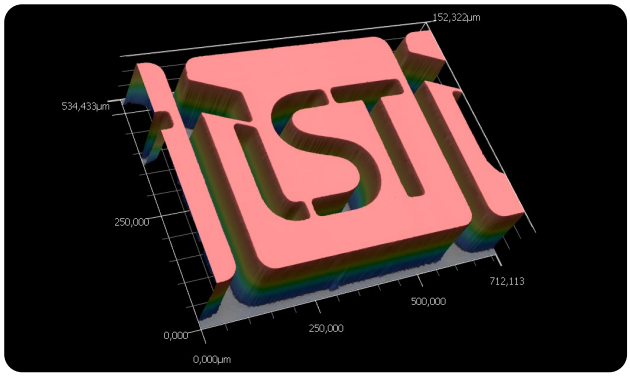


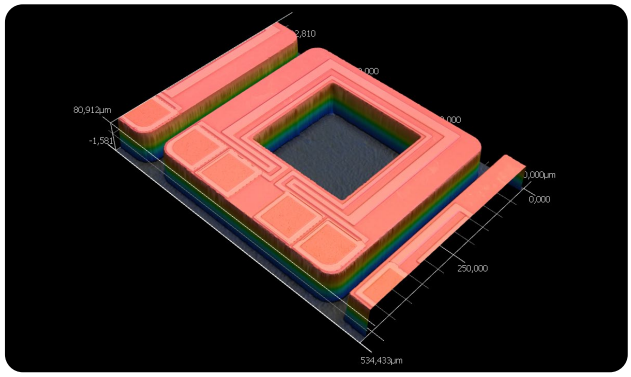




iST offers a wide range of sensors based on different technologies suitable for any application.

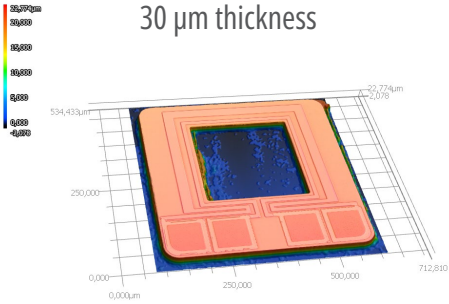
Chip geometry flexibility



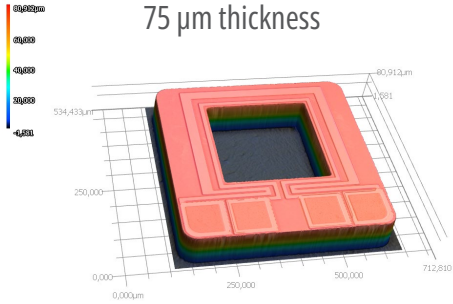


Chip thickness flexibility

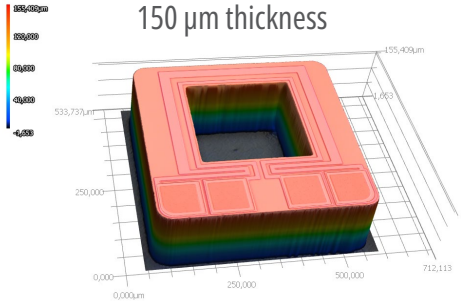
30 µm thickness



75 µm thickness

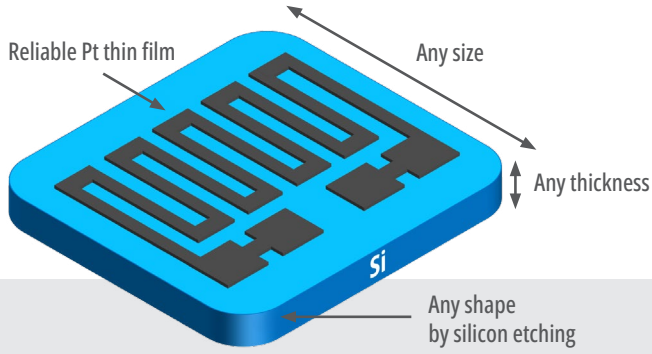


150 µm thickness



Design freedom at a glance

Established process flow combining reliable Pt thin films and silicon MEMS processes!



Benefits of silicon-based sensors

Miniaturization

Thin-film platinum patterned by photolithography allows high resistance values in very small areas. Up to 5 kΩ fits on 0.25 mm² of active area, and chip outlines below 0.5 × 0.5 mm² are achievable.

Design Freedom

Silicon etching defines the outline, so the chip is not restricted to a rectangle. Rounded edges, through-holes for mounting or fluid contact, custom thicknesses and slim geometries are all part of the design space. Sensors can be combined with heaters, or integrated alongside other silicon chips.

Scalability

Because the platform runs on standard semiconductor equipment and assembly methods, the same design carries from first samples to volume production – with the cost curve that comes with it.

Showcase 2

Pt-PTC plus heater on silicon

Temperature control element designed for a single customer's geometry

Challenge

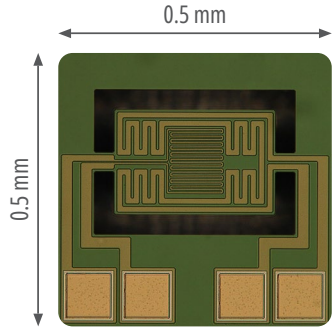
Precise temperature control with long-term stability, on a demanding chip design – rounded edges and a through-hole within a 0.5 × 0.5 mm² outline.

Solution

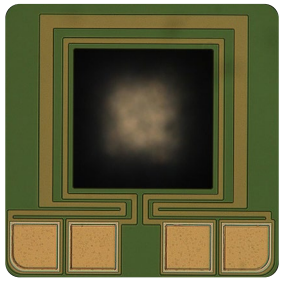
A customized chip design with adapted shape and thickness, etched holes matched to the mechanical construction, and heater plus temperature sensor on the same chip so control and measurement share a thermal path. Compatible with adjacent silicon components.

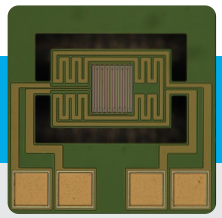
Benefits

A unique design for each customer, high flexibility in layout, the stability of platinum as the sensing material, and good price performance in volume.



Etched groove

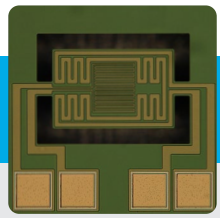

Etched hole



Conductivity + Heater

Multiparametric measurement and flexible combinations on one sensor

Temperature + Heater



Capabilities and applications

Multi-parametric measurement: Design your own chip

Why use three sensors where one will do? Built on iST's proven Pt-on-Si technology platform, our Si-T+ family combines long-term stable temperature measurement with additional parameters – starting with an integrated microheater and extending to interdigital structures and optical layers – on one and the same silicon chip.

At just 0.5 x 0.5 mm², our smallest sensor to date, it frees up board space and cuts the number of components and interconnects your assembly has to handle. Because every parameter is captured at the identical location and on the same time base, you get faster response and directly comparable readings instead of data stitched together from separate devices.

Silicon processing keeps geometries tight and repeatable, delivers long-term stability proven in high-volume datacom applications, and remains cost-effective at scale – with the freedom to define shape, thickness and feature set around your application.

Combine 2 parameters	**Heater**	**Flow**	**Pressure**	**Conductivity**
Temperature				

For 3 or more measurement parameters on one sensors please contact us!

Customized sensor solutions for your application

Benefit from an agile co-creation of your next sensor solution. Use our competence at component level and focus on your added value for fast and successful product development - from simple design adaptations to new measuring principles: from concept prototyping to high-volume manufacturing.

Design

- Conceptioning
- Material selection
- Process technology
- Layout & geometry

Patterning

- Photolithography
- Screen printing
- Laser trimming
- Dry & wet etching

Packaging

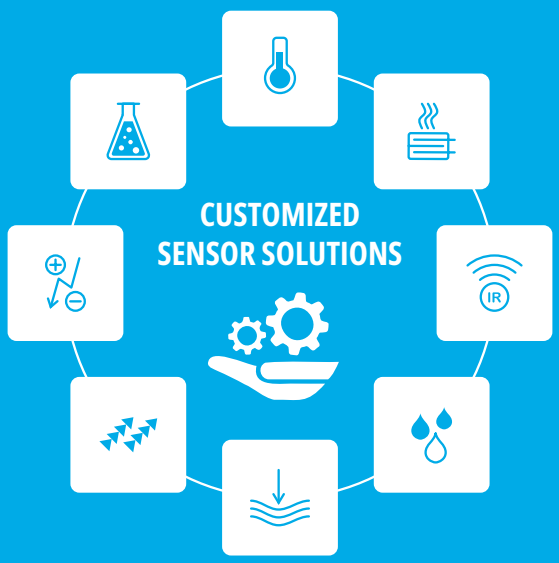
- Welding
- Bonding
- Soldering
- Hot-melt molding
- Injection molding

Services

- Electrical testing
- Optical/AOI testing
- ESD testing
- Calibration
- Metrology

Connection

- PTFE or PEEK insulated
- Ag, Ni/Au, Pt wire
- Cu/Ag, Cu/Ni wire
- AWG 34 to 20
- Flat or round wire
- Multistranded cables
- Ultra-thin wires
- Custom lengths
- Bondable, solderable
- Brazeable, weldable
- SMD & FlipChip
- ...and many more



Substrate

- Alumina
- Zirconia
- Sapphire
- Steel
- Copper
- Glass
- Polyimide
- Aluminium nitride
- Silicon

Metal thin film

- Pt
- Rh
- Ti
- Ni
- W
- Cr
- Ag
- Au
- Al
- Mo
- Alloys

Metal thick film

- Pt
- Au
- Ag
- Ni/Cr and other alloys

Dielectric thin film

- SiO_2
- Si_3N_4
- Ta_2O_5
- Polymers

Dielectric thick film

- Glass
- Organic polymers

Innovative Sensor Technology IST AG
Stegrütistrasse 14 · 9642 Ebnat-Kappel · Switzerland
+41 71 992 01 00 · info@ist-ag.com

www.ist-ag.com

260910