

Printed Electronics

Measurement and Production Technology
Competence Field

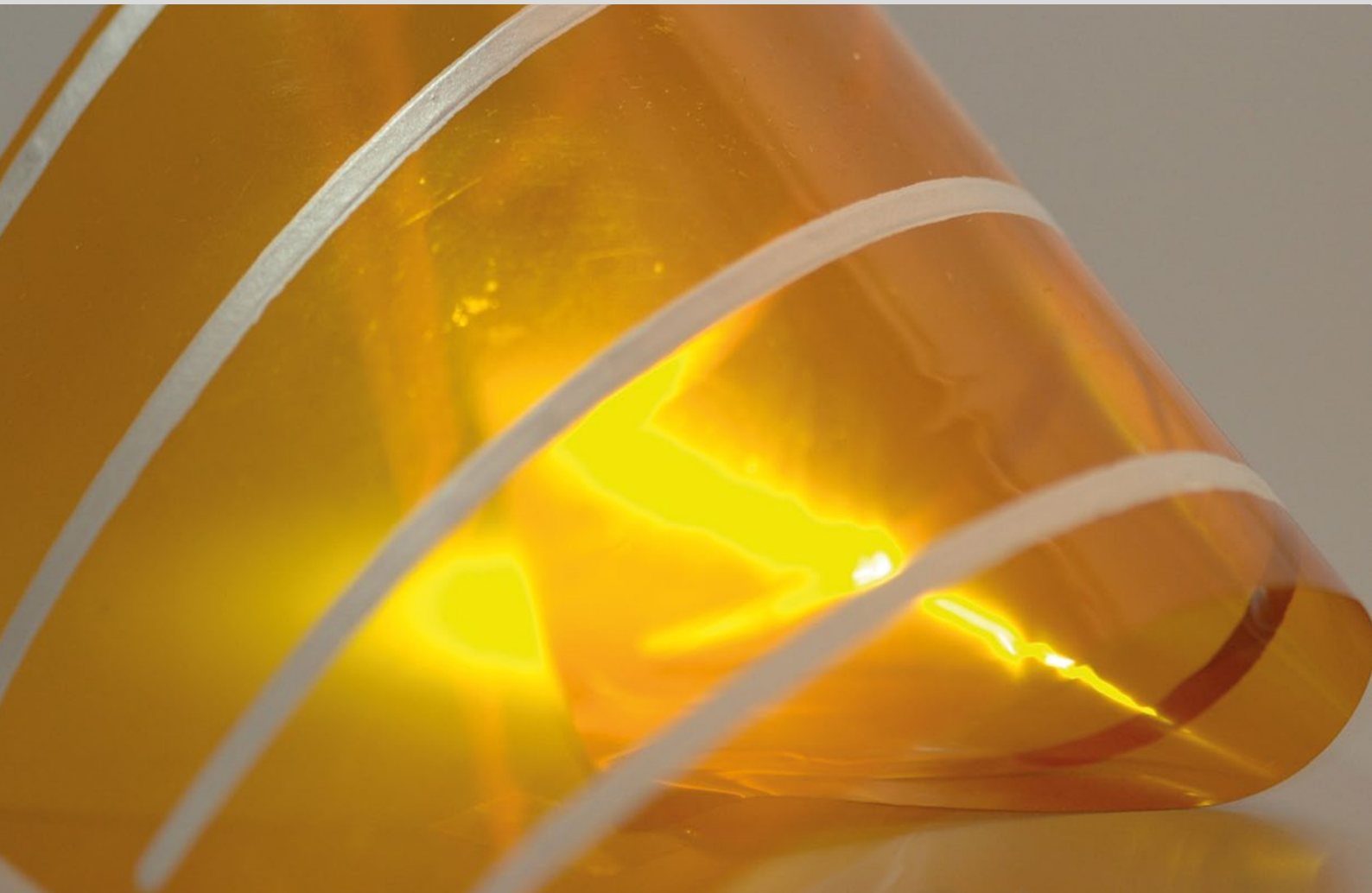
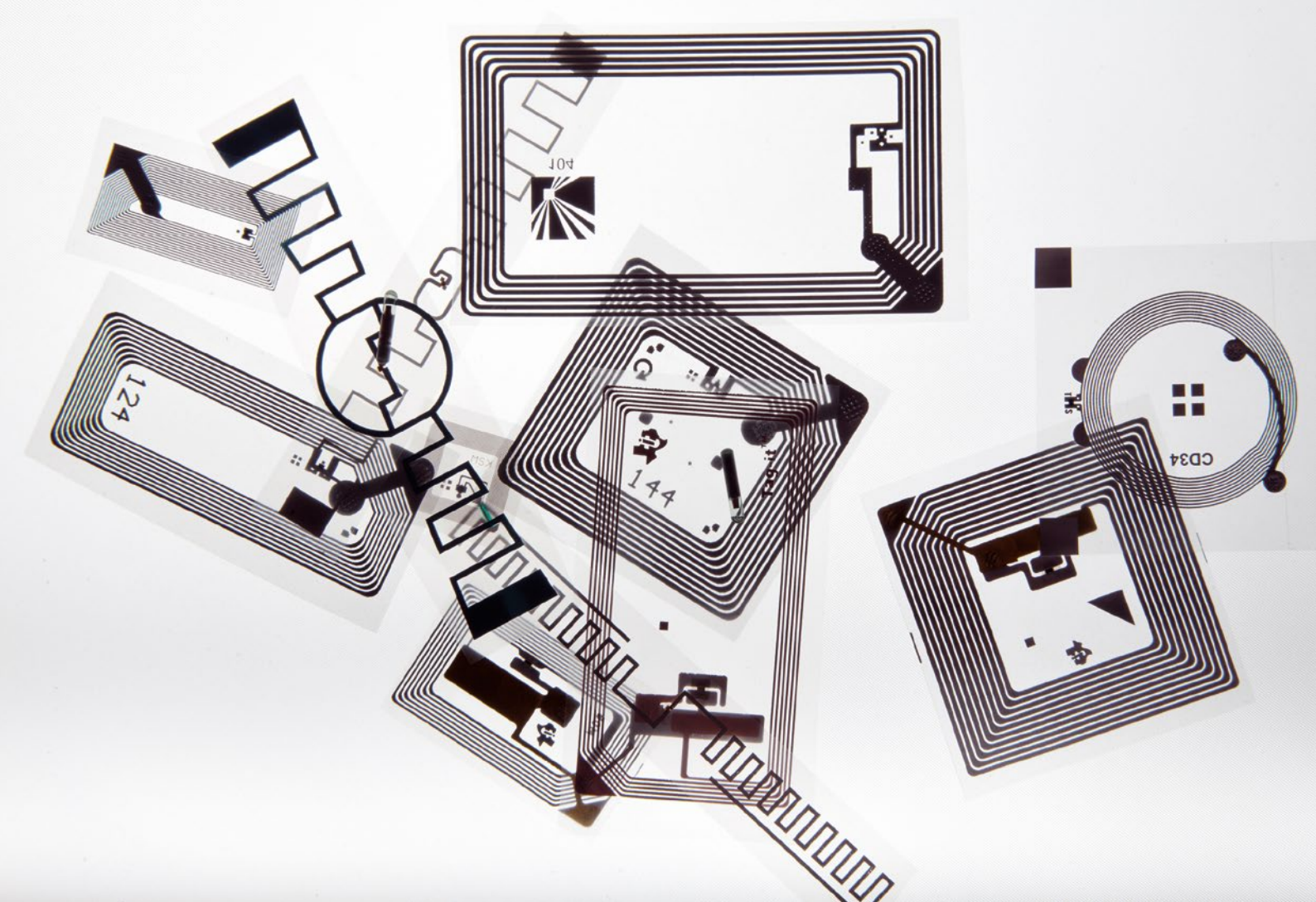
New Technology – Great Potential

The printing of electronic components and circuits is a new technology whose potential is far from being fully developed. Initial applications are found in the areas of displays, OLEDs, sensor systems and RFIDs. Measurement and production technologies must adapt to growing and changing requirements.

Polytec, with its wide range of measurement technology, offers outstanding expertise regarding the analysis of electrical properties, surface quality, film thickness and spectral characterisation.

In the area of production technologies and materials, the operation of the European Sinter Test Centres provides Polytec with extensive opportunities for testing the printed electronics. Systems for photonic sintering and UV curing as well as electrically conductive, flexible adhesives are all included in the range of services provided for the printed electronics.

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Solutions for Production

Photonic Sintering

Inks containing metallic nanoparticles are frequently used for printing conductive structures. The printed structures must meet high requirements. They need to adhere well to inexpensive carrier materials such as plastic film, paper or textiles, and they must be flexible and have permanent good conductivity.

Photonic sintering is used to markedly improve this conductivity. Sintering is a method of “baking” powdered materials below their typical melting point to produce a solid. Unlike thermal sintering, in which the sintering process takes place under pressure and heat impact, the energy input in the photonic sintering comes from high energy, short and spectral broadband light pulses.

The Polytec Xenon flash lamps are particularly suitable for photonic sintering processes. On the one hand the high energy input from the light pulse is so fast that the heat transfer from the metal to be sintered to the substrate remains below the damaging threshold for the substrate. On the other hand this extremely brief sintering process and the scalability of the Xenon systems permit a high throughput – a significant advantage for production.

European Sinter Test Centre

The US company Xenon Corporation supports customers and partners with a global network for photonic sintering. Polytec operates the three European test centres in Karlsruhe (Germany), Paris and London.

Extensive experience, for example with silver and copper-based nanoparticle inks on different substrates such as paper, PE and PU plastic films, glass and other fabrics forms the basis for defining the optimal parameters and the suitable equipment for your sintering process.

In addition to the actual process, diverse procedures are available to evaluate the sintering results. Important parameters can be determined, from an analysis of the microscopic structure through to the 3D topography of the sintered inks, from simple measurement of the electrical resistance through to the semi-automated four point probe measurement to be mapped.

Contact us – and capitalise on our experience!

Products

Polytec offers a range of sintering systems based on Xenon flash lamps for numerous applications – from a low-cost solution or from flexible and powerful systems and matching linear tables, right through to roll-to-roll systems.



Sinteron 500

The Sinteron 500 is an R&D desktop device for sintering printed circuits. It generates very high energy light pulses (290 - 830 J/pulse) and is therefore suitable for baking metallic nanoparticles and flakes at room temperature without significantly heating the substrate or neighbouring structures. There is a choice of three optional exposure areas. The system consists of control device, separate lamp housing with processing chamber or linear table and fan cooling.



Sinteron 2200/2300

The control unit of the Sinteron 2000 series is integrated in a 19 inch rack. The systems have been designed for development and production and reliably deliver pulses with consistently high energy. The sophisticated energy management of the Sinteron 2300 satisfies the requirements of any materials scientist. The individually configurable two-stage pulse may be varied in different pulse sequences. The touch panel computer controller offers the most up-to-date ease of use.



Sinteron 5000

The Sinteron 5000 has been designed for sintering silver inks in the production process. It enables printed electronics to be processed on flexible substrates such as plastic film, fabrics and paper at a speed of up to 30 metres per minute. Up to 10 lamps can be controlled individually using a touch panel, as can the roll speed, footprints and any overlap, and the pitch of the flash lamps.

UV Curing

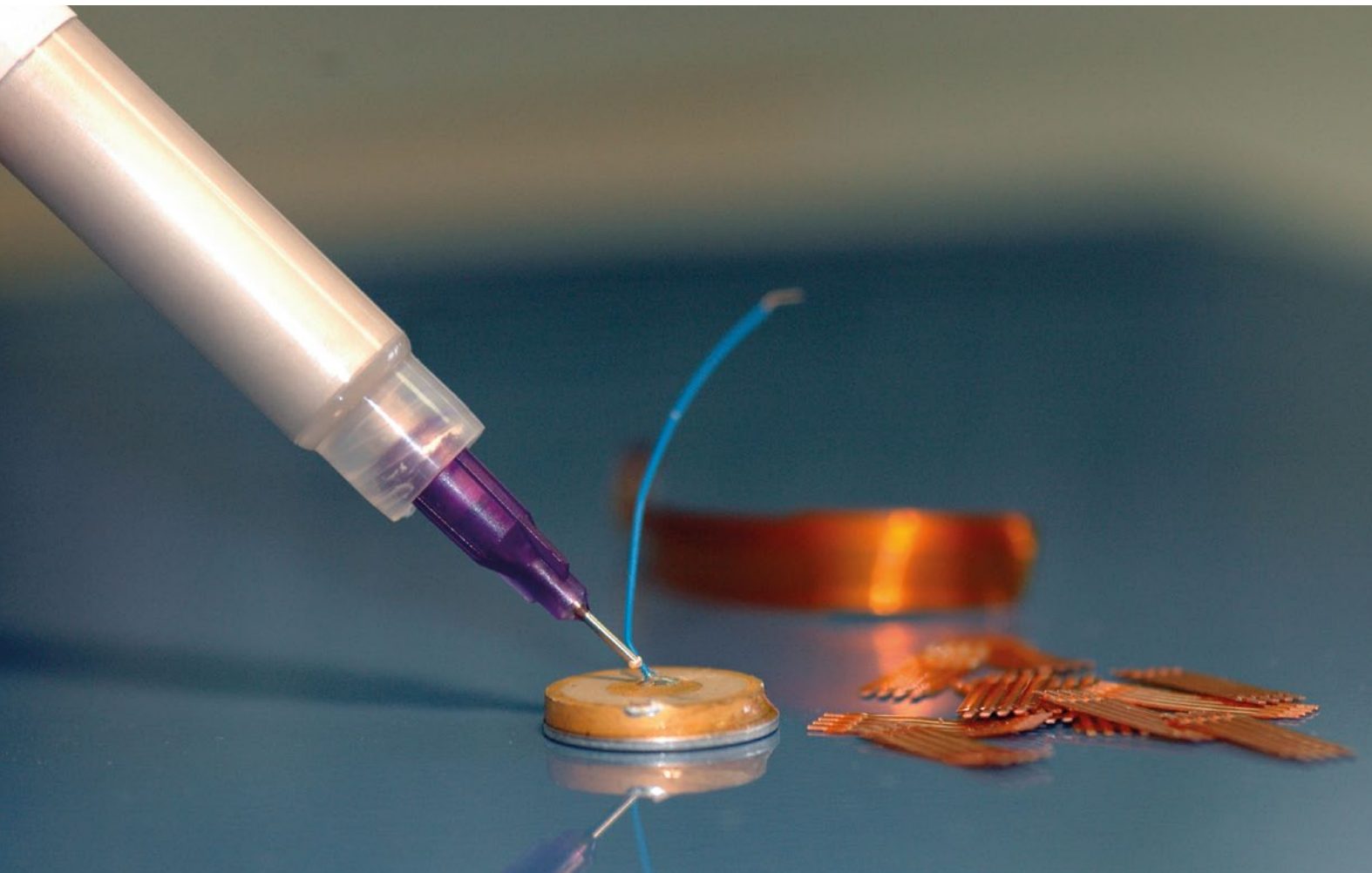
In addition to nanoparticle inks, paints and coatings are increasingly used in printed electronics that are dried and cured using UV light. Polytec offers solutions and products for inline and lab applications on the basis of three different technologies:

- UV curing using Xenon flash lamps
- UV curing using mercury vapour lamps
- UV curing using UV LEDs

This means the ideal solution can be found according to the type of application.

Adhesive Technology to Create a PCB Trace

Polytec draws on decades of experience in the use of electrical and thermal conductive adhesives in assembly and connection technology for electronic circuits. In co-operation with companies and institutes, we have continuously used our knowledge to advance this technology.



Quality Assurance Solutions

Optical Film Thickness Measurement

In the area of quality assurance, Polytec offers various options for contactless thickness measurement of transparent and opaque coatings and paints. These range from a simple manual gauge or inline systems – for example for roll-to-roll applications – through to a fully automated cassette-to-cassette system for glass panes or wafers. The systems are also differentiated according to the film thickness area. Film thicknesses from a few nanometres to several millimetres are measured.



Polytec's Inline system



Measuring station for thickness measurement of organic paints on rough surfaces

Resistance Measurement

The sheet resistance of a coating and the information derived from this - such as the resistivity, the charge carrier density or the film thickness - are basic characteristics that are required in several areas of printed electronics. Four point probe technology is a proven method for determining these parameters. Polytec offers a broad selection of laboratory systems for this purpose.

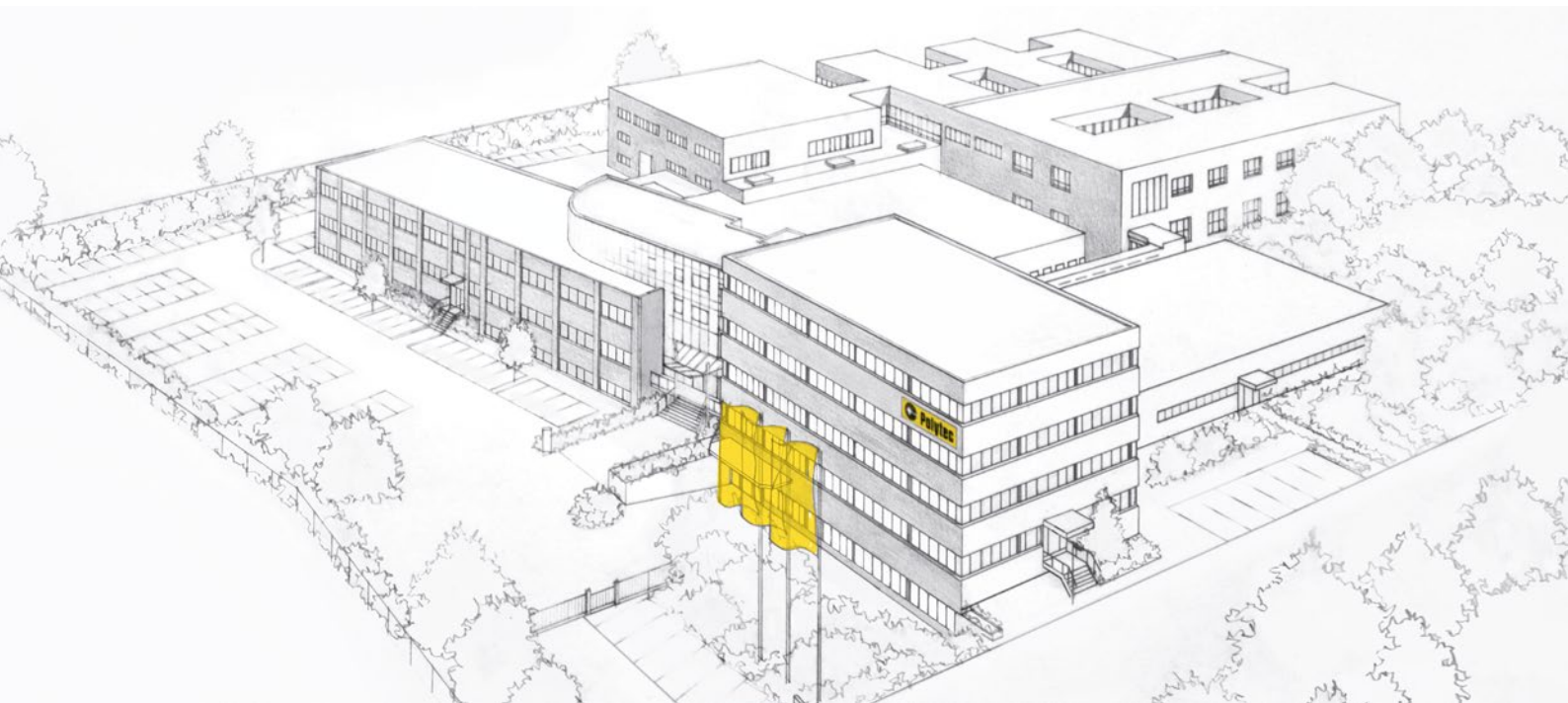
Surface Measurement

In the area of surface topography, Polytec offers high precision 3D measurement technology with resolutions up to the nanometre range – both for laboratory and other production environments.

The TopMap topography measurement systems developed by Polytec are high precision 3D profilometers to record the height data for almost any surface. They are ideal for contactless measurement of step heights, evenness, to determine volume and for surface characterisation.



Polytec's TMS-500 TopMap topography measurement system



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