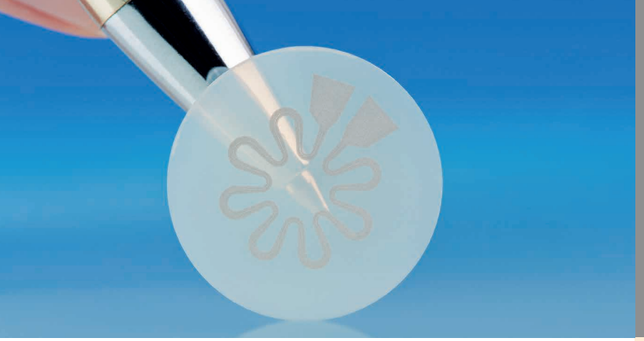

Fraunhofer
IKTS

FRAUNHOFER-INSTITUTE FOR
CERAMIC TECHNOLOGIES AND SYSTEMS IKTS

THICK-FILM COMPONENTS FOR INDUSTRIAL APPLICATIONS

In addition to pastes and inks developed exclusively for our customers, Fraunhofer IKTS offers the TFC paste series: standardized and tested thick-film pastes for applications in microelectronics, microsystem technology and sensor technology. The institute guarantees reproducible manufacturing processes (ERP) and product qualities which are certified according to DIN/ISO 9000. With the TFC pastes, the IKTS has a complete, worldwide unique thick-film paste system for aluminum nitride ceramics (AlN). Due to its high thermal conductivity, thermal and dielectric properties, AlN is an excellent substrate material for power electronics, radio frequency and microwave technology. It is also ideally suited as substrate for thick-film heaters.

The TFC thick-film pastes are optimized for achieving constant layer thicknesses and stable layer properties through screen printing. They are environmentally friendly, spare resources and meet current legal requirements according to RoHS II (Directive 2011/65/EC) and REACH (Regulation (EC) No 1907/2006). You can find more information about the various TFC pastes including relevant parameters under:
www.ikts.fraunhofer.de/en/tfc

FRAUNHOFER IKTS

The Fraunhofer Institute for Ceramic Technologies and Systems IKTS conducts applied research on high-performance ceramics. The institute's three sites in Dresden and Hermsdorf (Thuringia), Germany, collectively represent Europe's largest R&D institute dedicated to the study of ceramics.

As a research and technology service provider, Fraunhofer IKTS develops advanced high-performance ceramic materials, industrial manufacturing processes as well as prototype components and systems in complete production lines up to the pilot-plant scale. In addition, the research portfolio also includes materials diagnostics and testing.

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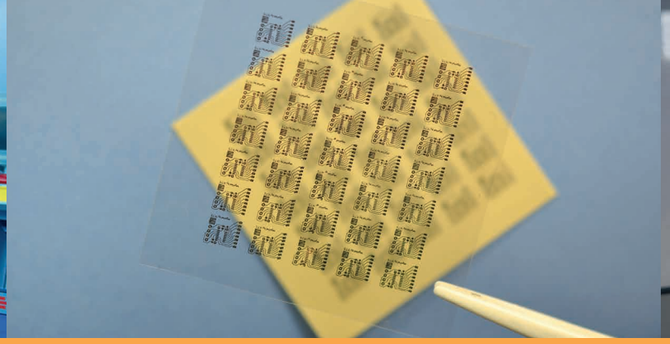
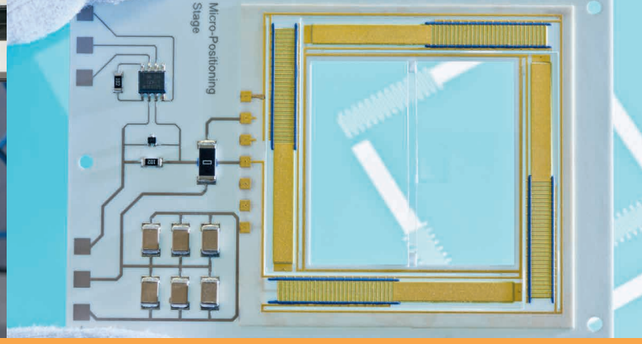
DEVELOPMENT – PRINTING – CHARACTERIZATION: THE 360° SERVICE FOR PASTES AND INKS

FROM RAW MATERIAL TO DESIGN: THE IKTS 360° SERVICE

The Fraunhofer IKTS covers the entire range of development for functional inks and pastes for various applications up to the semi-industrial scale: from the selection or synthesis of the inorganic materials through the adjustment of specific properties, the selection of the organic constituents, to the preparation of the suspension – adapted to the suitable printing method. The properties of the individual components of ink and paste up to the finished functional layer are constantly monitored throughout this process.

In order to optimally adapt functional layers to their application, Fraunhofer IKTS uses its comprehensive experience in inorganic powders and the selection of organic components. The inorganic components of the suspension used for printing can consist of various materials classes, ranging from ceramics and metal oxides to noble metals powders and glasses. The Fraunhofer IKTS runs various routes to adapt particles to specific applications. The organic components for the suspension are selected depending on substrate material, firing technology, final layer geometry and layer properties. The organic composition required for dispersion is chosen based on a comprehensive data matrix determined experimentally at IKTS.





PASTES AND INKS

Ceramics and oxides
- Dielectrics, piezo-, pyro-, ferroelectrics, magnetic materials
- Aluminum oxide, nickel oxide, perovskites, ruthenium oxide, silicon oxide, tungsten carbide cobalt
- Ceramic phosphors
- Bioceramic materials (phosphates)

Glasses
- Industrial and special glasses
- Glass ceramic composites

Metals and alloys
- Gold, palladium, platinum, silver
- Aluminum, lead, copper, nickel, ruthenium

Composites
- Metal-glass composites
- Metal-ceramic composites

SUBSTRATES

Ceramics
- Aluminum nitride, aluminum oxide
- Yttrium stabilized zirconium oxide, scandium oxide stabilized zirconium oxide
- Multilayer ceramics (HTCC, LTCC)
- Planar, tubular substrates and 3D surfaces

Metals
- Aluminum, stainless steel, copper, titanium

Polymers
- Polyethylene (PE), polypropylene (PP)
- Teflon (polytetrafluorethylene)
- Polyethylene terephthalate (PET)
- Polyimides (PI)
- Foils, fabrics

Glasses

Papers

Textiles

PRINTING METHODS

Mask based printing methods
- Screen printing, hot melt screen printing
- Mask printing
- Pad printing
- Roll coating

Direct printing
- Ink jet and aerosol jet printing
- (Micro-)Dispensing, hot melt dispensing
- Paste jetting

Methods of additive manufacturing
- Thermoplastic 3D printing (CerAM T3DP)
- Vat photo polymerization (CerAM VPP)/lithography based ceramic manufacturing (LCM)

FIELDS OF APPLICATION

Energy and environmental engineering
- SOFC, SOEC
- Batteries
- Photovoltaics
- Lightning protection
- Sealing and insulating layers
- Sonochemistry and sono catalysis

Heating elements

Sensors and actors
- pH sensor, heavy-metal ion sensor
- Mechanical, gas-, temperature sensors
- Ultrasonic sensors
- Piezoelectric sensors and actors

Microelectronics
- Touch displays
- Antenna for RFID tags

Medical technology
- Plaster
- Functionalized catheter bags

CHARACTERIZATION

Rheology | Printing behavior | Adhesion | Sintering behavior | Shrinkage behavior | Layer morphology | Electrical characterization | Dielectric characterization | Reliability test