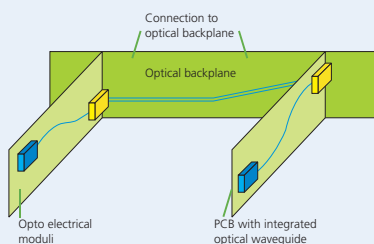
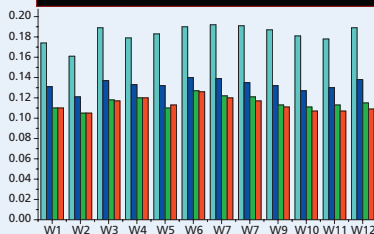
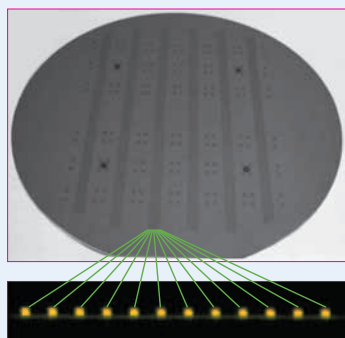


EpoCore & EpoClad — New Materials for Optical Wave Guides in PCB

For New Generation Interconnection Technology (NegIT)

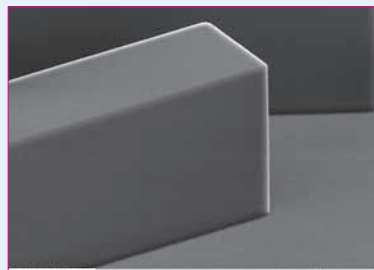


New Generation Interconnection Technology (NegIT)

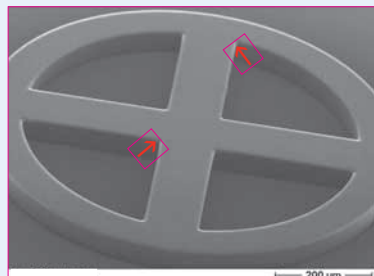


after:
 Lamination 185 °C 23.5 kp/cm²
 Reflow 3 x 230 °C
 TCT 100 x -40/125 °C
 TCT 204 x -40/125 °C

Low optical loss @ $\lambda = 830$ nm
 after standard tests: 0.1 dB/cm



Waveguide with smooth surface and vertical sidewalls



No microcracks on critical spots

Unique features

- Standard Lithography and PCB technology processing
- UV patterning of core and cladding
- High transmittance @ 850 nm
- High heat and pressure resistance
- Tunable refractive index (core/ cladding)

Applications

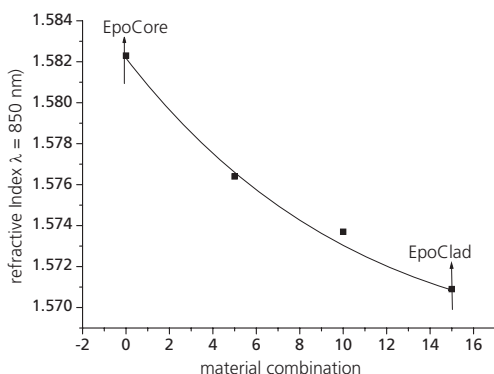
- Optical waveguides
- Etch mask
- Casting moulding
- Biosensors (multifunctional systems)
- UV resist

- Spin-coating of **EpoClad** onto FR4 substrate + prebake, film thickness = 50 μ m, UV curing (600 mJ/cm²), bake @ T~140 °C
- Spin-coating of **EpoCore** + prebake, film thickness = 50 μ m
- Photolithographic patterning of **EpoCore**: 600 mJ/cm², post exposure bake @ T>95 °C, hard bake @ T~140°C
- Casting of **EpoClad** + prebake, UV curing (600 mJ/cm²), bake @ T~140°C
- Laminate under pressure and heating with FR4 substrate

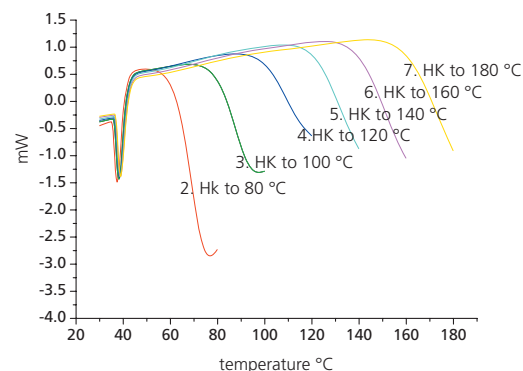
Technical data

Resin typ	Epoxy duromer
Waveguide	Refractive index @ $\lambda = 830$ nm: EpoCore 1.58, EpoClad 1.57
Glass transition temperature	> 180 °C
Substrate	Standard FR4 (10x10 cm, 8 inch)
Lamination	Standard temperature > 185 °C, pressure 23 kp/cm ²
Standard tests	Reflow: 3 x 15 s @ T = 230 °C; TCT: 240 x -40 °C / +120 °C
Optical loss	~0.2 dB/cm @ $\lambda = 850$ nm

- Fabrication with conventional equipment (UV lithography and PCB)
- High thermal stability (> 230 °C), high glass transition temperature (> 180 °C)
- Excellent stability of embedded, laminated waveguides after reflow and TCT tests



Refractive index tuning by copolymerisation



EpoCore, DSC-curve after repeated measurements with different final temperatures

- We gratefully acknowledge all contributions of our partners. BMBF Förderkennzeichen NeGIT 16SV 1819