

# ORMOCER®-based (nano-)hybrid composites as (in)direct restorative materials

## Basic properties

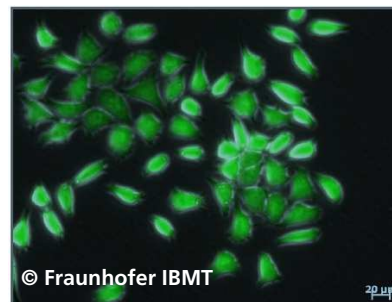
- Monomer free matrix systems → Biocompatible material basis
- Low polymerization shrinkage
- Optic adapted to natural teeth → Excellent aesthetic/translucency (eg. multi-layer design)
- High mechanic characteristic values, adaptable Young's modulus
- Strong chemical/physical bond

Properties	Matrix system	Composite/ GIZ
Viscosity	0.1 – 1000 Pa·s	adaptable
Filler content	—	up to 87 wt.-% (75 vol.-%)
Polymerization shrinkage	2 – 8 vol.-%	≥ 1,3 vol.-% / adaptable
Young's modulus	1 – 4000 MPa	up to 17 GPa
Flexural strength	up to 130 MPa	up to 180 MPa
Compressive strength	up to 300 MPa	up to 500 MPa
Coefficient of thermal expansion	50 – 250·10 <sup>-6</sup> K <sup>-1</sup> (5 – 50 °C)	≥ 17·10 <sup>-6</sup> K <sup>-1</sup>
Elastic stretch	up to 130 % (special matrix)	—
Radiopacity	—	310 – 360 % Al

## Toxicological test\*

- Extraction tests
  - BrdU test (DNA synthesis activities)
  - WST-1 test (metabolic activity)
- Direct contact test
  - Cytotoxicity

→ Biocompatible material basis!



\* Examinations of Fraunhofer IBMT

## Materials characterization/examination

- see data sheet *Characterization process*

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## ORMOCER<sup>®</sup>-based (nano-)hybrid composites as (in)direct restorative materials

### Indirect restoration

- (Chairside-)crowns / Inlays / Onlays

### Additional fields of application

- Bridges, veneers, dental prosthesis (e. g. artificial teeth)



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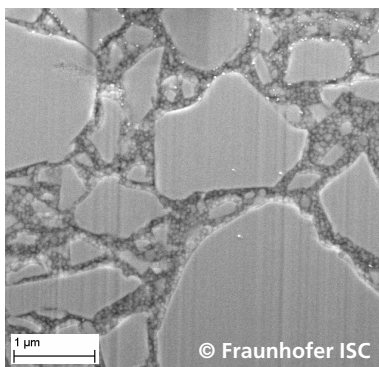


**Left:**  
High-translucent crown

**Right:**  
Cross-section of a multi-layer crown

### Direct restoration

- Long-term stable restoration through adapted adhesive system, Young's modulus, low polymerization shrinkage, high matrix/ composite strength



Hybrid matrix system  
combined with  
hybrid filler system

### Commercial (nano-)hybrid composites based on ORMOCER<sup>®</sup>s

Restorative and prophylaxis systems

- Admira<sup>®</sup>, VOCO GmbH, Cuxhaven
- Ceram X<sup>™</sup>, Dentsply DeTrey, Konstanz

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