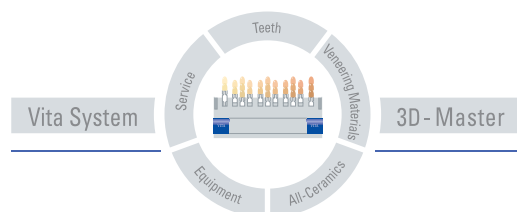


VITA All-Ceramics Systems

VITA In-Ceram® Classic SPINELL



Directions for use
Fabrication of the framework
In the slip-casting technique
Date of issue: 09-05



VITA

Dr. Norbert Thiel – Bad Säckingen, Germany

Spinell ($MgAl_2O_4$) is a natural mineral that is mainly found together with limestone and dolomite, sometimes also with granite or as loose sediment in sand. Spinell crystals are colourless or coloured, glassy, transparent or even opaque crystals with a cubic symmetry (fig. 1) which often reveals the tendency of twin formation. If the metal ions (Mg^{2+} , Al^{3+}) in a highly pure, colourless spinell are replaced by other metal ions, striking colour changes in the spinell can be observed: chromium ions create a red spinell colour, iron ions of different valences produce blue, brown or even green colour effects. Yet even yellow and pink spinell can be found quite often.

Due to the different types of spinell that are found, the composition of natural spinells varies strongly. Therefore, for industrial purposes, spinell is produced synthetically. Originally, magnesium oxide and aluminium oxide were mixed in a ratio of 1:1 and transformed to spinell at temperatures above 1600°C. Since this was a tricky process due to the high temperatures, nowadays other methods are used to synthesize spinell, e.g. by thermal decomposition of salt mixtures or by evaporation or decomposition of nitrides. Spinell ceramics feature some excellent material properties which are utilized in industrial applications.

Accordingly, due to its high melting point (2135 °C), its excellent stability - even at extreme temperatures

and the low thermal conductivity - spinell is used as a refractory material, e.g. in the form of furnace lining or protective pipes for thermocouples.

These properties as well as the fact that spinell is highly resistant to acids (fig. 1) contributed to the suitability of spinell as a material for corrosion-resistant melting crucibles. The jewellery industry takes advantage of the good transparency - the glass lustre as well as the possibility of obtaining different colours by adding certain metal ions and produces synthetic stones from spinell. High stability (fig. 4), good chemical resistance, high translucency and low electric conductivity are properties which have turned spinell into an interesting material for dental technology - a field, in which not only the materials that are used, but also the aesthetic quality that has to be achieved with these materials must satisfy high standards.

Up to now good results have been achieved in this field with the use of the In-Ceram Classic technique for which - in addition to the ALUMINA and ZIRCONIA POWDER, SPINELL POWDER is also used as a basis for the core material (fig. 2). This SPINELL POWDER has been matched to the proven In-Ceram Classic technique and the subsequent veneering process with VITA VM 7 fine-structure veneering ceramic. The colour of the originally white SPINELL POWDER is obtained – as in the case of ALUMINA and ZIRCONIA POWDER – by infiltrating with appropriate special coloured glasses (fig. 3).



Fig. 1:
Natural spinell crystallized
in an octahedron.

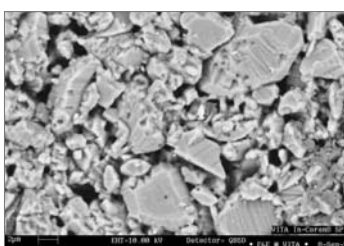


Fig. 2:
Porously sintered structure
of In-Ceram Classic SPINELL
(magnification x 10,000)

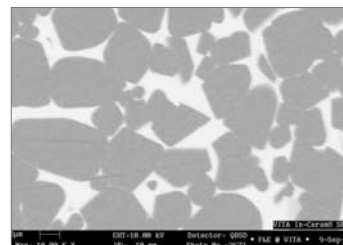


Fig. 3:
Glass-infiltrated structure
of In-Ceram Classic SPINELL
(magnification x 10,000)

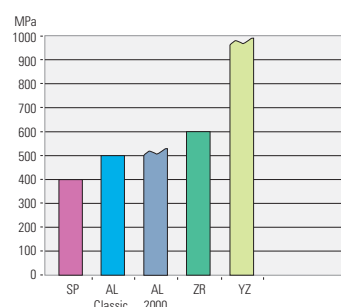
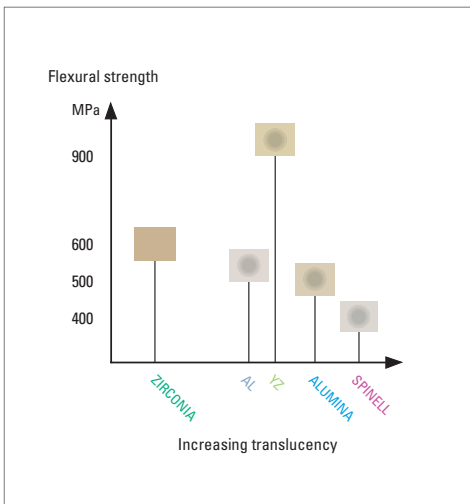


Fig. 4:
3-point bending strength of the VITA In-Ceram
product family according to ISO 6872

- VITA In-Ceram Classic SPINELL BLANKS
- VITA In-Ceram Classic ALUMINA BLANKS (AL Classic)
- VITA In-Ceram Classic ZIRCONIA BLANKS
- VITA In-Ceram 2000 AL CUBES (AL 2000)
- VITA In-Ceram 2000 YZ CUBES

VITA In-Ceram® Classic SPINELL is based on many years of clinical experience and features the following advantages:



Flexural strength [MPa]/Increasing translucency
 Overview of the different degrees of translucency and strength of the various VITA In-Ceram materials.
 In the case of VITA In-Ceram 2000 YZ the upper material sample was shaded with VITA COLORING LIQUID.

- optimum aesthetics and excellent biocompatibility, i.e.
 - no exposed metal margin
 - good light transmission properties
 - no retraction of the gingiva
 - accurate marginal fit (Fig. 5)
- withstands high functional stress due to excellent physical values
- no thermal irritations on account of low thermal conductivity
- offers the possibility of non-adhesive seating
- radiolucent
- high degree of acceptance among the patients
- positive cost/benefit ratio
 (e.g. no additional costs for high-priced alloys)
- standardized working procedures for the dental technician
- expandable system
- clinical experience since 1989

Indications of VITA In-Ceram® Classic SPINELL:

- Crown substructures, particularly for the anterior area in the case of younger patients, since In-Ceram Classic SPINELL is the most translucent material of the VITA In-Ceram product family.
- Substructures for inlays and onlays.

VITA In-Ceram® Classic SPINELL is not indicated in the following cases:

- If the functionally appropriate design of the restoration is not ensured.
 e.g. in the case of:
 - insufficient hard tooth substance
 - inadequate preparation results
 - bruxism
 - severe discoloration of prepared tooth



Prepared tooth



VITA In-Ceram Classic SPINELL crown in situ.
 Restorative work and photographs:
 M. Pfülb, Meerbusch

For information on preparation and cementation please refer to the booklet "Clinical Aspects" (order no. 808E).



Assortment	VITA order - no.:
<p>VITA In-Ceram® Classic SPINELL assortment in module box, complete</p> <p>Contents (also available separately): VITA In-Ceram Classic SPINELL GLASS POWDER S11, 25g VITA In-Ceram Classic SPINELL GLASS POWDER S12, 25g VITA In-Ceram Classic SPINELL GLASS POWDER S13, 25g VITA In-Ceram Classic SPINELL GLASS POWDER S14, 25g VITA In-Ceram Classic SPINELL POWDER, 200g VITA In-Ceram Classic Die Material for inlays/onlays 20 sachets of 15g VITA In-Ceram Classic Special Plster for crowns/bridges 20 sachets of 20g VITA In-Ceram Classic SPINELL Powder Liquid, 16 ampoules of 2.85 ml VITA In-Ceram Classic INSULATION GEL, 5g Duplicating rings, ø 28mm, 2 pcs Vakuum Mixing Beaker, incl. rubber stopper and glass tube Vacuum Mixing Beaker, glass only Spare plastic beaker with lid Pipette, gradations 1/10 ml Glass Spatula Brush no. IC3 Brush no. 1 Brush no. 3 Cartridge Superpolymer cartridge, set of 12 pcs Ice cube freezing bags, 5 pcs VITA In-Ceram Classic GLASS POWDER shade sample blade Working instructions</p>	<p>HSORSV2</p> <p>HS1125* HS1225 HS1325* HS1425* HSP200 HSSTN15 HGN20 HSPLN285 HIG5 B019 B130 B147 B099 B194 B056 B195 B085 B086 B196 B197 B198 B2711C 819E</p>

* materials not included in the assortment

- The VITA INCERAMAT as well as

- The VITASONIC II ultrasonic unit belong to the VITA In-Ceram Classic introductory equipment

- VITA VM 7 BASIC KIT, fine-structure ceramic for veneering VITA In-Ceram Classic SPINELL substructures.

VITA In-Ceram® Classic SPINELL working procedure:	Waiting times
1. Producing working model and master model	
2. Blocking out the working model	
3. Applying VITA In-Ceram Classic Interspace Varnish	Hardening 20 min.
4. Duplicating	Hardening approx. 20 min.
5. Deflasking duplicating mould	Recovery time at least 30 min.
6. Manufacturing firing tray model	Hardening 2 hrs.
7. Mixing and applying VITA In-Ceram Classic SPINELL POWDER	
8. 1st sintering firing in the VITA INCERAMAT	approx. 10 hrs.
8a. 2nd sintering firing in the VITA INCERAMAT (crown only)	approx. 3 hrs.
9. Reworking sintered substructure	
10. Applying VITA In-Ceram Classic SPINELL GLASS POWDER	
11. Glass infiltration firing in the VITA INCERAMAT	approx. 36 min.
12. Removing/sandblasting excess glass	
13. 1st glass control firing in the VITA VACUMAT	approx. 10 min.
13a. 2nd glass control firing in the VITA VACUMAT	approx. 10 min.
14. Veneering the substructure with VITA VM 7	