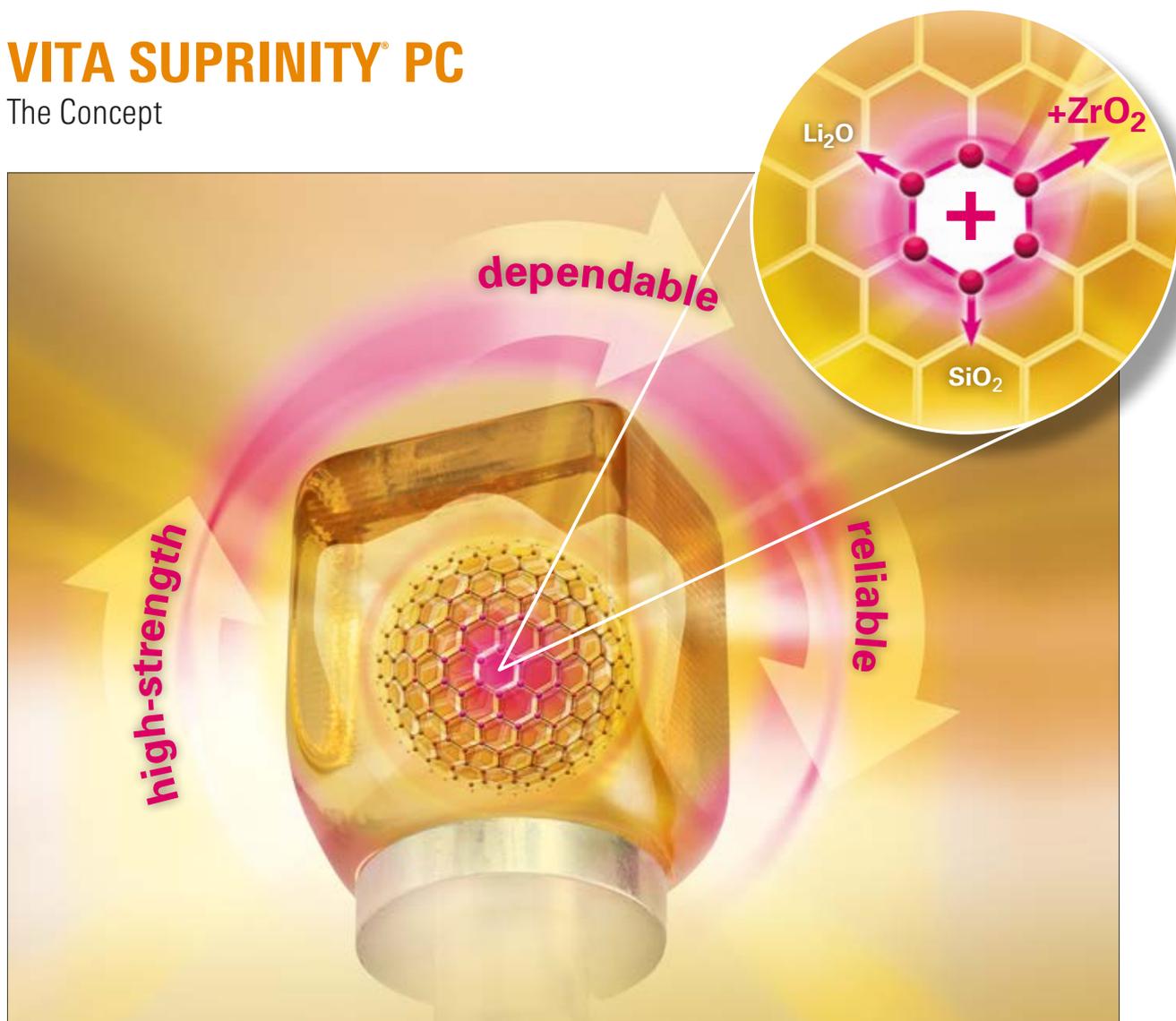


# VITA SUPRINITY® PC

The Concept



VITA shade determination

VITA shade communication

VITA shade reproduction

VITA shade control

Date of issue 2022-11

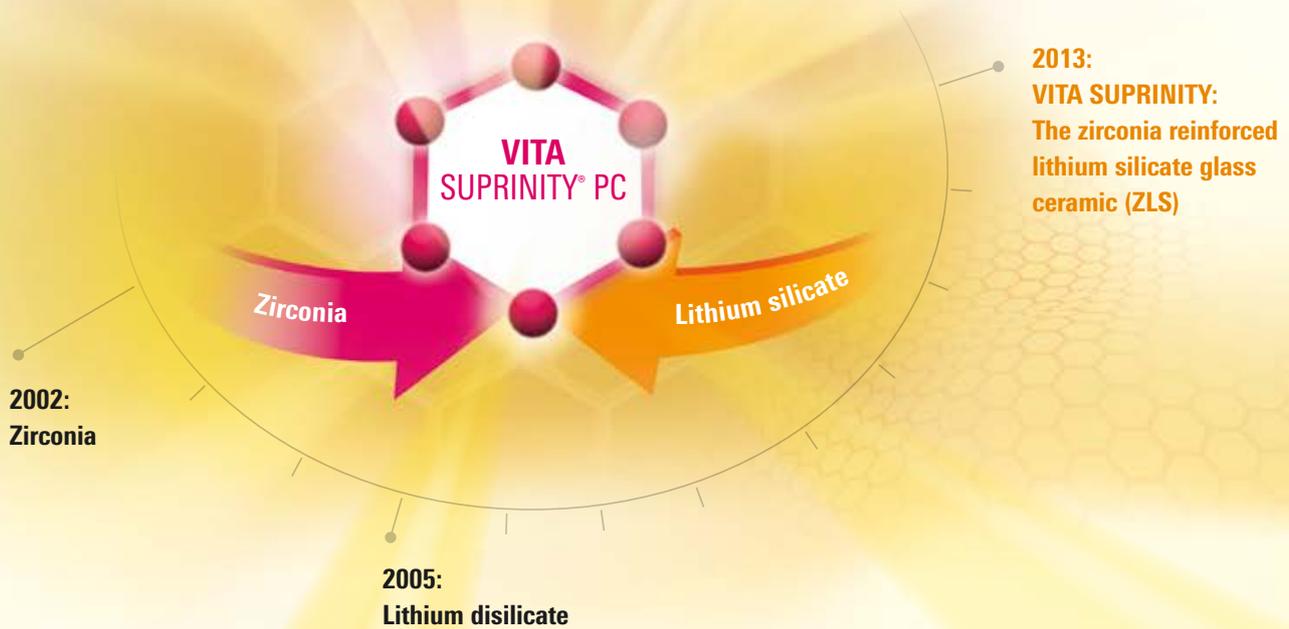


VITA – perfect match.

**VITA**

The zirconia reinforced, high-performance glass ceramic

## DEVELOPMENT STAGES OF CAD/CAM MATERIALS



### An element for excellent load capacity:

VITA SUPRINITY PC has a zirconia content that is approx. 10 times higher than that of lithium disilicate ceramic.



VITA SUPRINITY PC components	Wt%
ZrO <sub>2</sub> (zirconia)	8 – 12
SiO <sub>2</sub> (silicon dioxide)	56 – 64
Li <sub>2</sub> O (lithium oxide)	15 – 21
La <sub>2</sub> O <sub>3</sub> (lanthanum oxide)	0.1
Various	> 10



**"Excellent load capacity, thanks to a unique structure"**

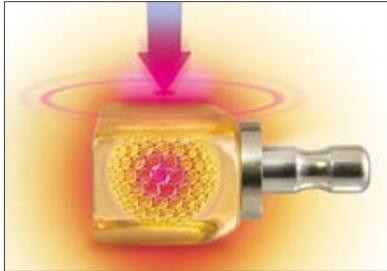
VITA Zahnfabrik has been offering VITA SUPRINITY PC, a generation of glass ceramic material products, since May 2016. With the aid of an innovative manufacturing process, the glass ceramic is enriched with zirconia (approx. 10 % by weight). The result is the world's first zirconia reinforced lithium silicate ceramic (ZLS)\*.

This glass ceramic features a particularly fine-grained and homogeneous structure, which guarantees excellent material quality and consistent high load capacity, as well as long-term reliability. In addition, the material also offers outstanding processing characteristics, like easy milling.

Esthetically pleasing results can be achieved with VITA SUPRINITY PC's excellent translucency, fluorescence and opalescence of the new glass-ceramic material. VITA SUPRINITY PC covers a wide range of indications that include anterior and posterior crowns, suprastructures on implant abutments, veneers, inlays and onlays.

\* This class of materials is a joint development of VITA Zahnfabrik, DeguDent GmbH and Fraunhofer-Institute for Silicate Research ISC.

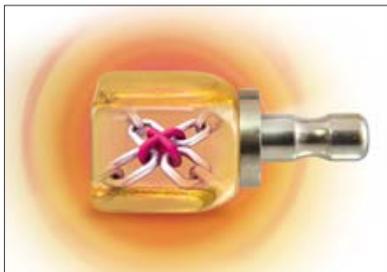
## VITA SUPRINITY® PC Overview of benefits



The glass ceramic for excellent load capacity.

### **Excellent load capacity:**

Thanks to excellent mechanical load capacity, VITA SUPRINITY PC promises high reliability and long-term clinical success.



Added reliability, thanks to zirconia reinforcement.

### **Outstanding reliability:**

The results of continuous load tests and the Weibull modulus show that VITA SUPRINITY PC offers durable restorations and a maximum level of reliability.



Processing made easy

### **Simple processing:**

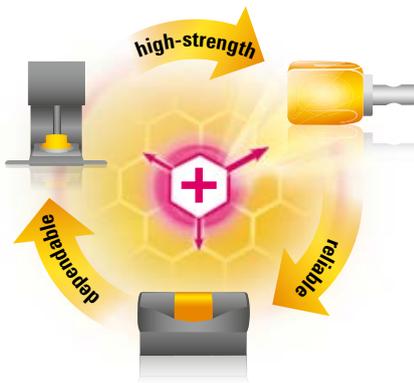
The new glass ceramic features high firing stability and can be crystallized without using an auxiliary firing paste. In addition, the material can be easily reworked manually.



Precise restorations with Sirona's MC XL system.

### **Optimal precision:**

Compared to lithium disilicate ceramics, VITA SUPRINITY PC reveals improved edge stability after milling with Sirona's MC XL system. This ensures restorations with an accurate fit.



Reliable and user-friendly: milling, firing and processing.

### **High process reliability:**

VITA SUPRINITY PC provides particularly high processing reliability. As a result, temperatures during the crystallization process that are slightly below or above the standard temperature do not have a significant influence on dimensional stability or mechanical properties.

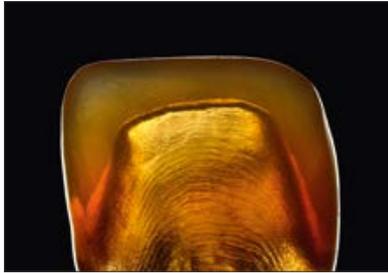


VITA SUPRINITY PC restorations impress with a natural play of colors.

### **Excellent esthetics:**

Esthetically pleasing results can be achieved with VITA SUPRINITY PC's excellent translucency, fluorescence and opalescence. Plus, the natural play of colors can be perfectly reproduced with VITA VM 11 veneering material.

## VITA SUPRINITY® PC Esthetics



Natural play of colors.

### **Natural play of colors in all shade nuances:**

VITA SUPRINITY PC glass ceramic demonstrates a variety of shade nuances, which are achieved by a special preparation process of coloring components and the unique manufacturing process of VITA SUPRINITY PC.

### **Excellent translucency and opalescence:**

VITA SUPRINITY PC features natural translucency with an opalescent play of colors. Since zirconia is finely distributed in the glass phase, crystallization of the zirconia particles is eliminated. As a result, the zirconia does not have any opaque effect.



Natural translucency.

### **Integrated fluorescence:**

Due to the unique material structure and the addition of rare earth elements, the new generation of glass ceramic products reveals increased and natural fluorescence for all tooth shades.



Excellent opalescence.



Integrated fluorescence.

## VITA SUPRINITY® PC Indications, variations, geometries, shades



Ideal for a variety of indications.

### VITA SUPRINITY PC offers great versatility

#### Range of indications:

VITA SUPRINITY PC can be used for a wide range of indications, including anterior and posterior crowns, suprastructures on implant abutments, veneers, inlays and onlays.

#### Variations:

VITA SUPRINITY PC is the zirconia reinforced lithium silicate ceramic in the precrytallized state (**P**artially **C**rytallized).

#### Geometry sizes:

VITA SUPRINITY PC is available in the geometry PC-14 (18 x 14 x 12 mm).

#### Range of shades:

VITA SUPRINITY PC is available in the VITA SYSTEM 3D-MASTER shades 0M1, 1M1, 1M2, 2M2, 3M2, 4M2 and in the VITA classical A1–D4 shades A1, A2, A3, A3.5, B2, C2 and D2.



The glass ceramic in the precrystallized state as VITA SUPRINITY PC (transparent)



## VITA SUPRINITY® PC A system with matched components

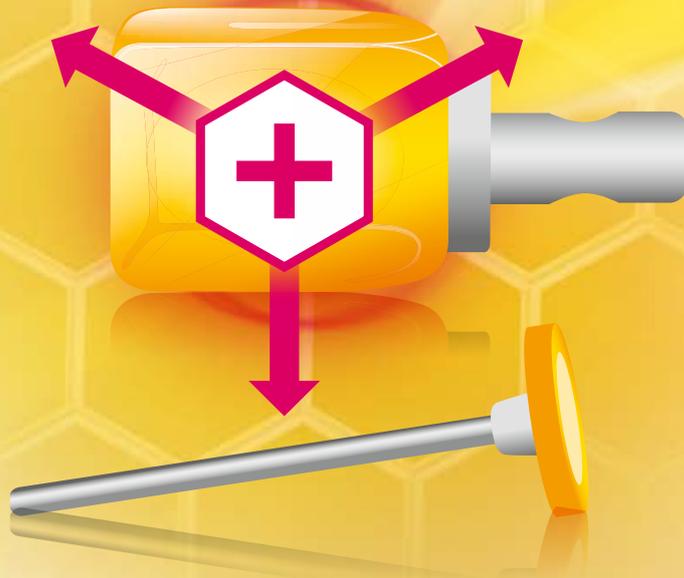
### Perfect combination

Complementary products for polishing, characterizing and veneering for VITA SUPRINITY PC are specifically matched with the new generation of glass ceramic products.

VITA AKZENT® Plus



VITAVM® 11



VITA SUPRINITY® Polishing Set

A smiling man with a beard and blue eyes, wearing a blue button-down shirt, is pointing upwards with his right hand and to the side with his left hand. The background is a soft, light yellow gradient.

VITA VM 11 veneering material is available for veneering restorations made of VITA SUPRINITY PC. The VITA SUPRINITY polishing sets provide a high gloss polish. VITA AKZENT Plus is suitable for simple and esthetically convincing shade characterization, providing **an ideal solution with excellent results** for practices and laboratories.

## VITA SUPRINITY® Polishing Set (clinical / technical)



### Instruments for pre- and high-gloss polishing

The VITA SUPRINITY Polishing Sets were developed for reliable, efficient and material-specific surface treatment of zirconia reinforced lithium silicate ceramic (ZLS) restorations in dental practices and laboratories. The sets include various polishing instruments for pre- and high-gloss polishing.

These instruments are suitable for careful and gentle polishing of occlusal surfaces, cusps, fissures and restoration contact points. These polishing instruments ensure a brilliant shine on the finished restoration.



The easy and fast way to an excellent shine.

### Easy to use and consistently good results

#### Excellent final results:

Highly esthetic, plaque-resistant surfaces can be produced with these instruments. Accurate concentricity, matched grit sizes and the individual geometries of the instruments ensure highly precise results.

#### Simple and safe handling:

The instruments provide removal capacity that can be easily controlled and show low wear. Good handling and the ability to use without polishing paste enables simple and fast processing. Safe use of these clinical instruments is guaranteed through sterilization.

#### Gentle and careful processing:

These instruments, which were developed especially for VITA SUPRINITY PC, offer gentle and careful processing.



## VITA SUPRINITY® PC – Characterization with VITA AKZENT® Plus



### Impressive options for shade characterization

With the 19 VITA AKZENT Plus stains, practices and laboratories can characterize the shade of any dental ceramic material easily and efficiently, regardless of the restoration's CTE. These new fluorescent stains allow internal staining of restorations during layering, as well as staining and glazing of external surfaces.

Depending on the user's preferred method of processing and the relevant area of application, VITA AKZENT Plus stains are available as powders and ready-to-use pastes. The glazing Body Stains and Glaze materials are also available as sprays.

Three different application forms are available:

#### POWDER:

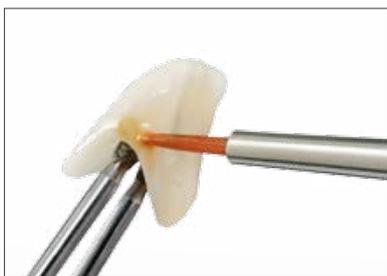
for unlimited flexibility and cost-effectiveness

#### PASTE:

ready-to-use pastes with uniform consistency and homogeneous pigmentation

#### SPRAY:

ready-to-use, easy-to-apply glaze and finishing agent stains



### What practices and laboratories benefit from

#### Versatile:

With 19 shades and three application forms, VITA AKZENT Plus offers dental practices and laboratories a complete range of products for numerous characterization options.

#### User-friendly:

The VITA AKZENT Plus stains are designed as a comprehensive system and are coordinated with each other to ensure a high level of reliability during processing.

#### Cost-effective:

In addition to characterizing VITA SUPRINITY PC restorations, VITA AKZENT Plus stains are also suitable for all other dental ceramic materials, regardless of the restoration's CTE.



The stains enable outstanding shade characterization.

## VITA SUPRINITY® PC – Individualization with VITAVM®11



### **Perfectly matched veneering material**

VITA VM 11 is a low fusing fine-structure feldspar ceramic that has been developed especially for individualizing crown substructures made of zirconia reinforced lithium silicate ceramic (ZLS).

Due to its individual CTE, a separate veneering material is required for this generation of glass ceramic. The perfectly matched CTE values of substructure and veneering materials help minimize stress to ensure superior bonding and veneering reliability that is free of warping.

### **The benefits of VITA VM 11 for the user**

#### **Highly esthetic restorations:**

The high translucency and warm shades of VITA VM 11, in combination with the opalescent effect of VITA SUPRINITY PC, create highly esthetic restorations with a vivid play of colors.

#### **Reliable bonding:**

Stress-free and reliable bonding is ensured through a perfect match of both CTE ranges.

#### **Simple processing:**

Excellent stability, minimal shrinkage and high edge stability are distinctive features of VITA VM 11. Thanks to the excellent surface wettability of the new glass ceramic VITA SUPRINITY PC, multiple layering without liner firing or washbake is possible.

#### **Superb firing stability:**

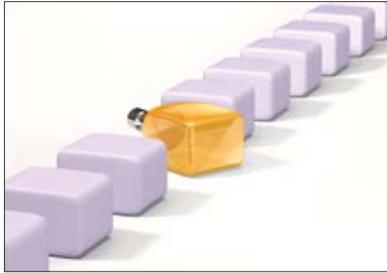
The outstanding firing properties of VITA VM 11 result in very high dimensional stability, even after several firings.

#### **Excellent grinding and polishing properties:**

Thanks to the proven fine structure of VITA VM 11, its smooth and densely sealed surface can be easily and quickly polished.



## VITA SUPRINITY® PC Findings of materials science



Zirconia reinforced glass ceramics: VITA SUPRINITY PC.

### Zirconia-reinforced glass ceramic

The use of zirconia in the dental sector was an important milestone in the early 2000's; the material enabled the fabrication of multi-unit, all-ceramic bridges for the first time. Lithium disilicate-based glass ceramic has been available to dental users all over the world since 2005.

VITA SUPRINITY PC reflects the systematic advancement in this field. This advanced generation of glass ceramic materials combines the positive material characteristics of zirconia ( $ZrO_2$ ) and glass ceramic.

A zirconia reinforced lithium silicate glass ceramic material (ZLS) was developed in cooperation with Degudent GmbH and the Fraunhofer Institute for Silicate Research (ISC). Thanks to a  $ZrO_2$  content of approx. 10 percent by weight, a structure is obtained after crystallization, which exhibits excellent mechanical properties and fulfills the highest esthetic requirements. Starting in May 2016, the ZLS glass ceramic was enriched with 0.1 wt% lanthanum oxide, and precrystallization of the various shade and translucency levels was also optimized to ensure consistent processability.

As a result, the glass-ceramic blocks in the pre-crystallized state sometimes have a different appearance. The esthetic appearance and the mechanical properties of the final products, however, are identical. As a result the values determined with VITA SUPRINITY can also be transferred to VITA SUPRINITY PC.

The following test results demonstrate the effects of these material properties and how VITA SUPRINITY PC differs from current CAD/CAM materials.

### Short overview - physical/mechanical properties

Test	VITA SUPRINITY
3-point flexural strength	approx. 420 MPa* <sup>1</sup>
3-point flexural strength, precrystallized	approx. 180 MPa
Biaxial strength	approx. 540 MPa* <sup>2</sup>
Modulus of elasticity	approx. 70 GPa
Weibull modulus	approx. 8.9
CTE	approx. $11.9-12.3 \cdot 10^{-6}/K$

\*<sup>1</sup>) The 3-point flexural strength value indicated is the average of numerous lot tests performed by VITA's Quality Control with partially automated preparation of specimens, which resulted in lower strength values than those obtained for careful manual preparation of specimens.

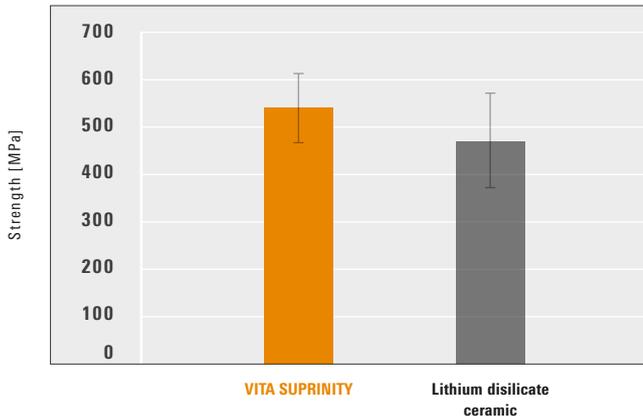
\*<sup>2</sup>) Based on ISO 6872 with modified geometry of specimens.

Starting in May 2016, the ZLS glass ceramic was enriched with 0.1 wt% lanthanum oxide. The mechanical properties of the final products, however, are identical. For this reason the values determined with VITA SUPRINITY can also be transferred to VITA SUPRINITY PC.

# VITA SUPRINITY® PC Findings of materials science

## Excellent load capacity ensures reliability

### Biaxial strength\*



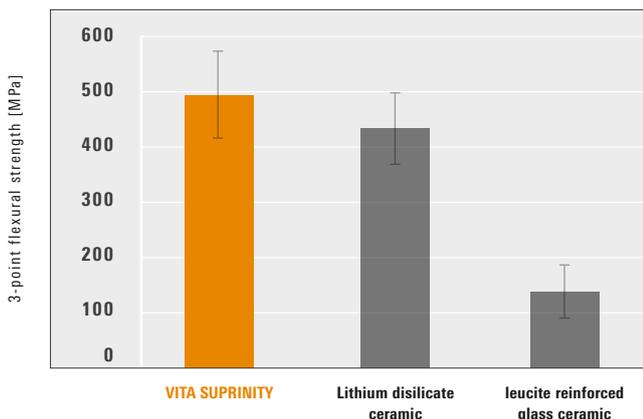
Source: Internal study, VITA R&D, (Gödiker, 01/2012, [1] see back of brochure)

#### Test method:

- Test was carried out based on ISO 6872 with a modified geometry of specimens.
- To reduce defects of margins, the blocks were not turned first, but rectangular discs were prepared from the blocks with comparable geometries using a diamond wire saw.
- Then a uniform layer of thickness of approx. 1.2 mm was milled using a lapping machine and final crystallization was carried out according to the manufacturer's instructions.
- Twenty specimens of each material were loaded until fracturing occurred (Zwick universal testing machine) and the strength was determined.
- To calculate the stress, the diameter used in the formula was replaced by the length of the shorter side of the rectangle.

**Conclusion:** With a value of 541 MPa, VITA SUPRINITY features a higher average strength and lower standard deviation than lithium disilicate ceramic in this test.

### 3-point flexural strength after milling\*



Source: Internal study, VITA R&D, (Gödiker, 08/2012, [1] see back of brochure)

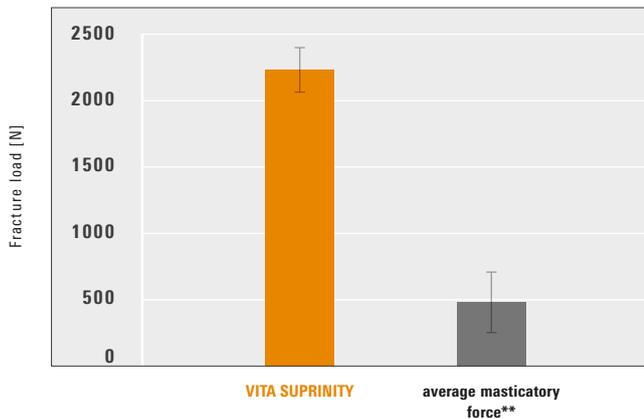
#### Test method:

- The test was carried out in accordance with ISO 6872.
- A diamond saw was used to prepare bending rods from the blocks.
- Using a SiC suspension (grain size 1,200), the specimens were milled manually to a uniform layer thickness of approx. 1.2 mm, a chamfer was added and crystallization was carried out according to the manufacturer's instructions. No additional tempering process was completed for the leucite reinforced glass ceramic.
- Ten specimens of each material were loaded until fracturing occurred (Zwick universal testing machine) and the 3-point flexural strength was determined.

**Conclusion:** In this test series, VITA SUPRINITY produced an average flexural strength of 494.5 MPa. This value is more than three times higher than that determined for traditional leucite reinforced glass ceramic (138.7 MPa). The result for the lithium silicate ceramic in this test is 435.0 MPa.

\* Starting in May 2016 the ZLS glass ceramic was enriched with 0.1 wt% lanthanum oxide. The mechanical properties of the final products, however, are identical. For this reason the values determined with VITA SUPRINITY can also be transferred to VITA SUPRINITY PC.

### Static fracture load\*

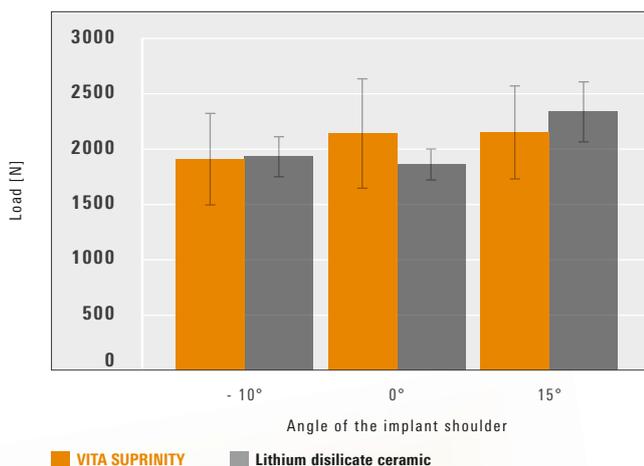


Source: Internal study, VITA R&D, (Gödiker, 06/2011, [1] see back of brochure)

- Molar crowns made of VITA SUPRINITY were milled using the MC XL system and then polished and crystallized.
- The crowns were bonded to hybrid ceramic dies (modulus of elasticity: 23 GPa) using RelyX Unicem (self-adhesive, 3M ESPE) and then immersed for accelerated aging in warm water (37°C) for one week.
- In a testing machine, static load was applied to the crowns until fracturing occurred.
- The bars represent the average value obtained based on six crowns.

**Conclusion:** In this test setup, VITA SUPRINITY withstands a load of approx. 2,262 N. The average maximum masticatory force, however, ranges from approx. 490 N to 725 N(\*\*[2]). Consequently, the molar crowns that were used withstood significantly higher loads.

### Fracture load of implant crowns\*



Source: Internal study, VITA R&D, (Gödiker, 10/2012, [1] see back of brochure)

- Initially, implant bodies were fabricated (non-precious metal), which only had different shoulder angles.
- Angles of -10°, 0° and 15° were used for this test setup.
- The implants were embedded in a resin with a modulus of elasticity similar to bone (Ren Cast CW20/Ren HY49, Huntsman). Then the milled crowns (Sirona MC XL-System) were cemented to the implants using Multilink Implant (Ivoclar Vivadent).
- A series of five crowns of each material were tested for each angle.
- In a testing machine, static load was applied to the crowns until fracturing occurred.

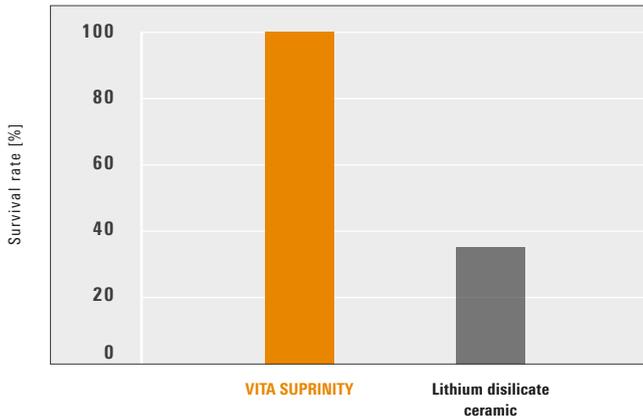
**Conclusion:** With values of approximately 2000 N, the static tests on implants for VITA SUPRINITY produced a similar result as on tooth stumps made of a hybrid material.

\* Starting in May 2016 the ZLS glass ceramic was enriched with 0.1 wt% lanthanum oxide. The mechanical properties of the final products, however, are identical. For this reason the values determined with VITA SUPRINITY can also be transferred to VITA SUPRINITY PC.

# VITA SUPRINITY® PC Findings of materials science

## VITA SUPRINITY PC stands for outstanding reliability

### Dynamic load test\*



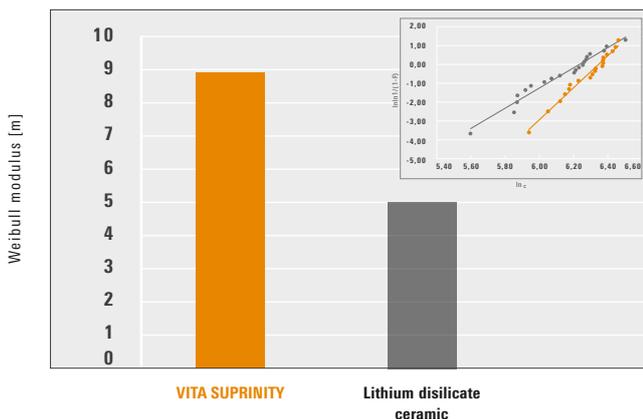
Source: Internal study, VITA R&D, (Gödiker, 06/2011, [1] see back of brochure)

### Test method:

- Six crowns of each material (VITA SUPRINITY, lithium disilicate ceramic) were tested in the Dynamess machine.
- Following etching, the crowns were cemented to dies made of a hybrid material (modulus of elasticity approx. 23 GPa) using RelyX Unicem (3M ESPE).
- The specimens were embedded in Technovit 4000 (Heraeus Kulzer) and immersed in warm water (37 °C) for at least one week.
- Following accelerated aging, the crowns were subjected to a cyclic load : 1,200 N for 1.2 million cycles, 2.0 Hz, 5 mm steel beads as the antagonist, temperature: 37 °C.

**Conclusion:** The survival rate of the VITA SUPRINITY crowns in this test was 100%. The masticatory force used in the test was 1,200 N, far exceeding the maximum force of human jaw muscles.

### Weibull modulus\*



Source: Internal study, VITA R&D, (Gödiker, 01/2012, [1] see back of brochure)

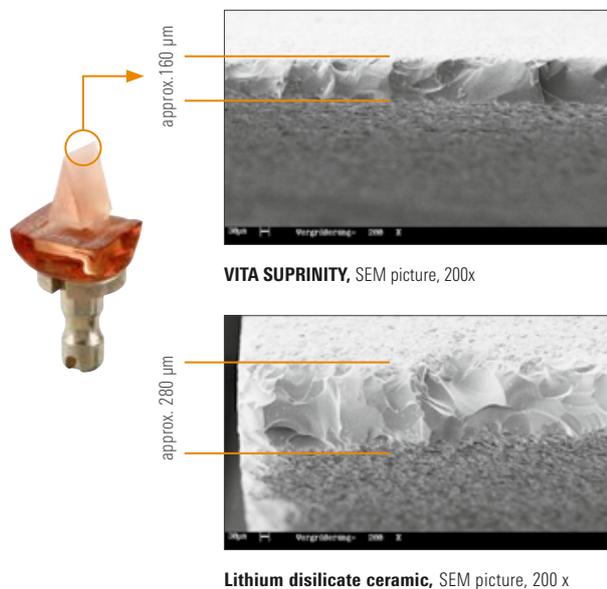
### Test method:

- The Weibull modulus was determined based on the flexural strength of 20 bending bars.
- Using a theory developed by Weibull, based on the concept of failure of the weakest link, the strength distribution of ceramic materials can be described effectively in mathematical terms. (3).
- A high Weibull modulus indicates uniform material quality, which in addition to the high load capacity values, is an indicator for the reliability of a material.

**Conclusion:** In this test VITA SUPRINITY exhibits the highest Weibull modulus in this class of materials.

\* Starting in May 2016 the ZLS glass ceramic was enriched with 0.1 wt% lanthanum oxide. The mechanical properties of the final products, however, are identical. As a result the values determined with VITA SUPRINITY can also be transferred to VITA SUPRINITY PC.

## Simple processing and optimized precision\*

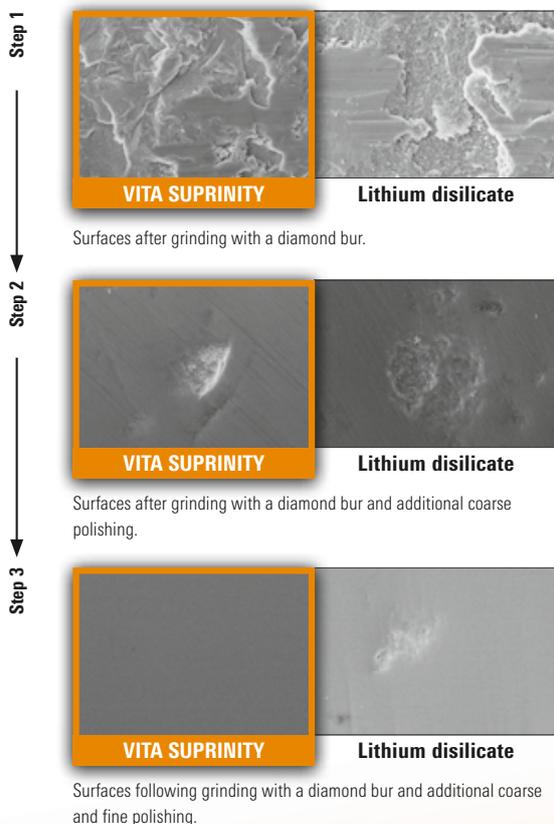


### Test method:

- Using Sirona's MC XL system, wedge-shaped 30° test specimens made of two glass ceramic materials (VITA SUPRINITY and lithium disilicate) were milled from blocks in normal milling mode.
- To evaluate the edge stability, the width of the wedge tips were measured under the scanning electron microscope.

**Conclusion:** When using the default milling programs (normal mode), VITA SUPRINITY exhibits higher marginal accuracy than the lithium silicate ceramic.

Source: Internal study, VITA R&D (Gödiker, 12/2011 [1] cf. p. 20)



### Test method:

- Plates with an area of 20 x 20 mm were prepared; manual polishing was carried out.
- Three tools were used for reworking: fine diamond, prepolisher and fine polisher.
- The processing time for each stage was 30 seconds.

**Conclusion:** In the case of VITA SUPRINITY, the test geometry can be polished to high gloss within 90 seconds, using the instruments recommended.

Source: Internal study, VITA R&D, (Gödiker, 09/2012, [1] see back of brochure)

\* Starting in May 2016 the ZLS glass ceramic was enriched with 0.1 wt% lanthanum oxide. The mechanical properties of the final products, however, are identical. For this reason the values determined with VITA SUPRINITY can also be transferred to VITA SUPRINITY PC.

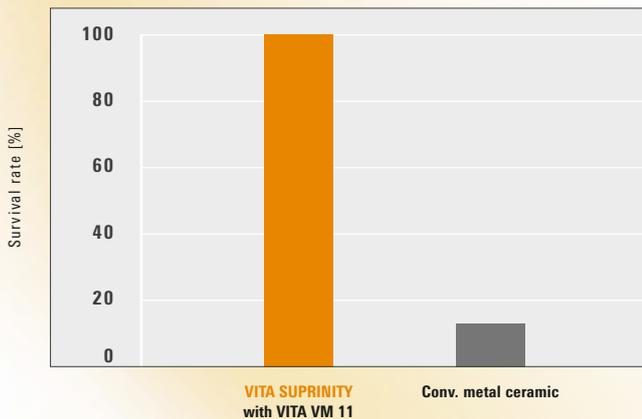
## VITA SUPRINITY® PC Findings of materials science

### VITA SUPRINITY PC and VITA VM 11 veneering material: matched perfectly!

#### Physical/mechanical properties

VITA VM 11	Unit of measure	Value
CTE (coefficient of thermal expansion)	10 <sup>-6</sup> /K	approx. 11.2 – 11.6
Softening temperature	°C	approx. 600
Transformation temperature (TG)	°C	approx. 540
3-point flexural strength	MPa	approx. 100

#### Survival rate of thermal shock resistance\*



Source: Internal study, VITA R&D, (Gödiker, 11/2011, [1] see back of brochure)

#### Test method:

- Six crowns were fabricated using VITA SUPRINITY in accordance with the working instructions, then they were veneered with VITA VM 11.
- Afterwards, the crowns were heated to 105 °C in a furnace, left in the furnace for 30 minutes and quenched subsequently in ice water.
- After the crowns had been checked for cracks and flaking, the undamaged specimens were heated up to 120 °C.
- This process was completed using steps of 15 °C until a temperature of 165 °C was reached. The higher the survival rate, the lower the risk of cracks or flaking of the veneering material, based on long-term experience in daily use.
- The values were compared with the average values of a series of tests over numerous years of VMK generations in combination with non-precious metal alloys.

**Conclusion:** In combination with VITA VM 11, VITA SUPRINITY reveals perfect thermal shock resistance. When using conventional metal ceramics, in most cases, the first cracks are formed at temperatures starting at 135 °C.

\* Starting in May 2016 the ZLS glass ceramic was enriched with 0.1 wt% lanthanum oxide. The mechanical properties of the final products, however, are identical. For this reason the values determined with VITA SUPRINITY can also be transferred to VITA SUPRINITY PC.

## VITA SUPRINITY® PC Material and accessories



### VITA SUPRINITY PC

The zirconia reinforced VITA SUPRINITY PC glass ceramic features a particularly fine-grained and homogeneous microstructure, which ensures excellent material quality and consistent high load capacity, as well as long-term reliability.

- Excellent load capacity and high reliability
- Simple processing and optimized precision
- High process reliability
- Exceptional esthetics



### VITA SUPRINITY Polishing Set clinical/technical

The sets include various polishing instruments for pre- and high-gloss polishing.

- These instruments are suitable for careful and gentle polishing of occlusal surfaces, cusps, fissures and restoration contact points.
- These polishing instruments ensure a brilliant shine on the finished restoration.



### VITA AKZENT Plus

The 19 VITA AKZENT Plus stains are used to characterize the shade of any dental ceramic material easily and efficiently, regardless of the restoration's CTE.

- These new fluorescent stains allow staining and glazing of restorations.
- VITA AKZENT Plus stains are available as powders and ready-to-use pastes.
- Glaze is also available as a spray.



### VITA VM 11

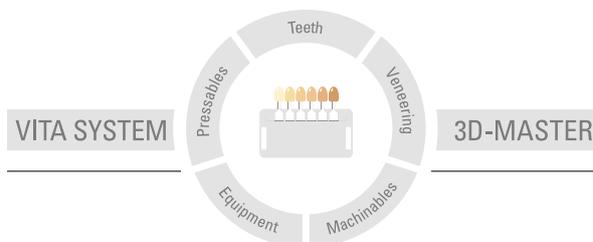
VITA VM 11 is a low fusing fine-structure feldspar ceramic that has been developed especially for individualizing crown substructures made of zirconia reinforced lithium silicate ceramic (ZLS).

- Highly esthetic restorations
- Reliable bonding
- Simple processing
- Superb firing stability
- Excellent grinding and polishing properties

## References

1. Internal studies, VITA R&D:  
VITA Zahnfabrik H. Rauter GmbH & Co. KG  
Ressort Forschung und Entwicklung  
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Spitalgasse 3  
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Prof. Dr. Dr. Jens Fischer, Ressortleiter F&E Anorganische Chemie,  
Bad Säckingen  
Date of issue: 07.13
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3. Brevier Technische Keramik (2003).  
Verband der Keramischen Industrie e.V.

More information about VITA SUPRINITY PC is available at:  
[www.vita-suprinity.de](http://www.vita-suprinity.de) / [www.vita-suprinity.com](http://www.vita-suprinity.com)



**Please note:** Our products must be used in accordance with the instructions for use. We accept no liability for any damage resulting from incorrect handling or usage. The user is furthermore obliged to check the product before use with regard to its suitability for the intended area of applications. We cannot accept any liability if the product is used in conjunction with materials and equipment from other manufacturers that are not compatible or not authorized for use with our product and this results in damage. The VITA Modulbox is not necessarily a component of the product. Date of issue of this information: 2022-11

After the publication of this information for use any previous versions become obsolete. The current version can be found at [www.vita-zahnfabrik.com](http://www.vita-zahnfabrik.com)

VITA Zahnfabrik has been certified and the following products bear the CE mark

**CE 0124** :  Rx Only  
**VITA SUPRINITY® PC · VITAVM®11 · VITA AKZENT® Plus**

EVE Ernst Vetter GmbH, Keltern, Germany, has been certified in accordance with the Medical Device Directive and the following product bears the CE mark:

**CE 0483**  
**VITA SUPRINITY® Polishing Set clinical**

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