

The world of Sinnotec  
silicate technologie

**SINNOTEC**   
FUTURE MATERIALS





1. Corrosion of reinforced concrete

2. Sinnotec technology

3. Sinnotec geopolymers

4. Application examples

5. Sinnotec GmbH

## 1. Corrosion of concrete

1. Capillary porosity
  - Water uptake
  - Mikrobiological grow
  - Frost-dew-corossion
2. Physical crosslinked needles
  - Good compressive strenght
  - Limited tensile stength
  - Limited adhesion to the substrate
3. Ca. 25% Calcium hydroxid
  - Carbonatisation
  - Effluescence
  - Poor acid resistance
4. Tension, cracks
  - Steel reinforcement
  - Joints between construction elements

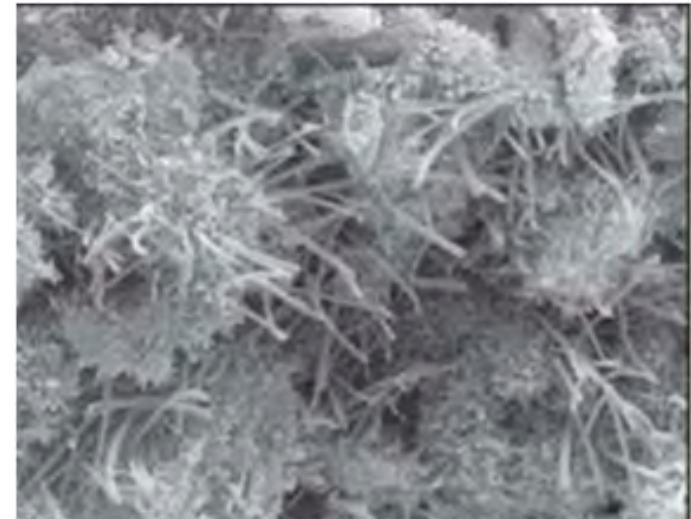


Bild: Prof. Schmidt et. Al.,  
„Die chancenreiche  
Dimension im Bauwesen,  
Teil 2“, Cement International 5, 2007, S.  
72-85

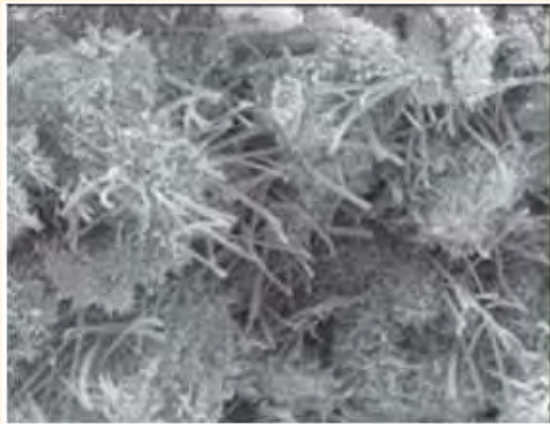


## 1. Fair faced concrete finishes

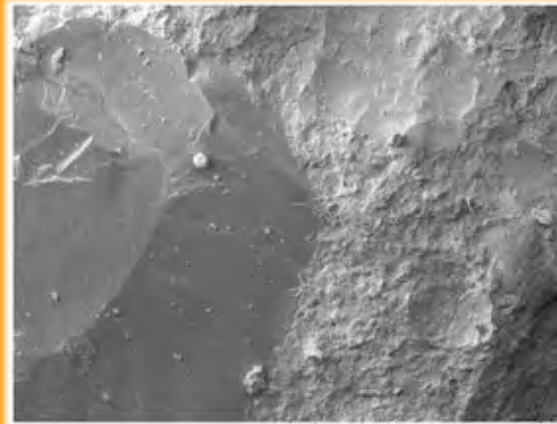
Constructions from concrete could be effected by effects as mentioned bevore. By the use of products based on geopolymer technology this corrosion could be avoidet or renovated:



➤ REM-pictures of the micro structure



**Typical cement  
C30/37  
scale: 23 µm**



**innovative  
silicate product  
scale: 7 µm**



**Typical polymer  
coating,  
scale: 10 µm**

Pictures left: University of Kassel, Prof. Schmidt et. Al., „Die chancenreiche Dimension im Bauwesen, Teil 2“, Cement International 5 (6), 2007, S. 72-85), middle: University of Kassel, Dr. Jörg Rathenow, final report on project HA-181/09-11, 12/2010, Sinnotec GmbH, Wiesbaden, right: private Sinnotec GmbH

## ➤ 3 Different Technology Platforms

### **CSH optimized systems (waterproofing and construction materials)**


- **Optimized early water resistance**
- **Optimally crack- and stress-free**
- **Resistant to pH3 (2% acidity)**
- **Optimized solvent and alkali resistance**
- **Heat resistant up to 500 °C**
- **Good value for money**

### **Siliceous Systems (corrosion protection and construction chemicals)**

- **Optimized substrate adhesion**
- **Crack- and stress-free**
- **Resistant to pH0 (20% acidity)**
- **Optimal solvent resistance**
- **Heat resistant up to 1.350 °C.**
- **Excellent properties**

### **Impregnation of concrete (concrete upgrade and soil protection)**

- **Optimized substrate penetration**
- **Sealing by pore sealing (no microbiology)**
- **No efflorescence effects**
- **Resistant to pH3 (2% acidity)**
- **Optimal LM and caustic resistance**
- **Heat resistant up to 800 °C**

- 
1. Corrosion of reinforced concrete
  2. Sinnotec technology
  3. Sinnotec geopolymers
  4. Application examples
  5. Sinnotec GmbH

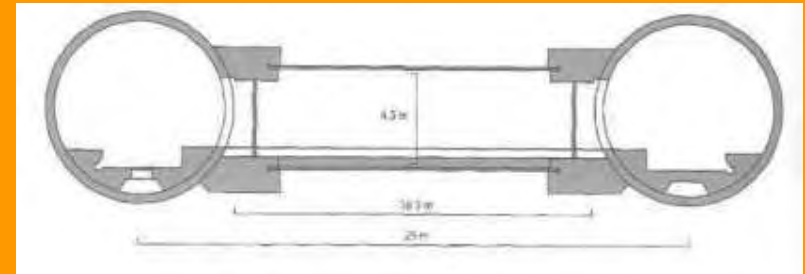
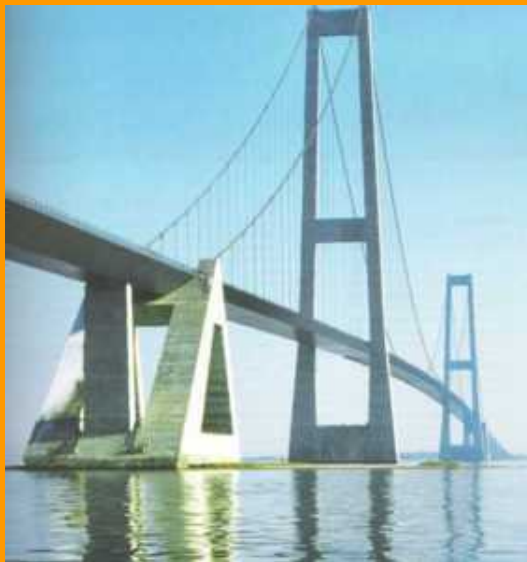


- Concrete upgrade and soil protection for facades, design concrete, floor coating, biogas plants, agriculture and industry
- Waterproofing and construction chemicals in ground-, drinking-, sea- and wastewater (sewage treatment plants, swimming pools, water engineering, tunnels, bridges)
- Anti-corrosion protection on steel for drinking water and sewage pipes, pipelines, geothermal plants, plant engineering and construction, heavy industry, power plants
- Construction materials, e.g. screeding systems especially for underfloor heating, hygienic- or rapid assemblies





New projects with silicate technology products  
**Storebælt bridge und railway tunnel, DK-Korsør**



**400 m<sup>2</sup> test application for sealing of the anchor block and the railway tunnel,  
Realization the 05.10.2009**

New projects with silicate technology products  
**Storebælt bridge und railway tunnel, DK-Korsør**



**400 m<sup>2</sup> test application for sealing of the anchor block and the railway tunnel,  
Realization the 05.10.2009**

New projects with silicate technology products

**Sydney Opera House, renovation concept with Building Durability Pty Ltd.**



**100 m<sup>2</sup> test application for sealing of the basement, tile glue and grouting,  
Realization the 07.03.2011**

New projects with silicate technology products

**Cargill biodiesel production, WHG protection for concrete in tank storage**



**400 m<sup>2</sup> protection from oil penetration, rapseed oil methy ester and microbiological attack with non slip properties, realization the 12.07.2013**






New projects with silicate technology products

**Concrete boat from silicate mortar, concrete boat regatta Nürnberg**



**Self supporting construction of glass fibre reinforced silicate mortar, waterproof and elastic, 4,6m length, 48kg weight, realization the 21.06.2013**

Renovation concrete waste water pipeline, Bottrop, DN 500, 50m

 <p>31/03/2010</p>		 <p>31.03.11 LZ1: 000.80 m 00 00 41 Betriebsgelände DVD von Schacht=42710 nach Schacht=42725 UR=inDN=400 B Haltung =42710</p>
<p><b>Heavily corroded pipeline after cleaning, steel reinforcement corrodes, cleaning 1 hour</b></p>	<p><b>Application of 6mm silicate mortar, consumption 12 kg/m<sup>2</sup>, duration 1h, drying time 2h</b></p>	<p><b>After 7 years in use: No spalling, excellent corrosion protection for steel reinforcement</b></p>

New projects with silicate technology products

**Fair faced concrete fassade impregnation, N3 Engine Overhaul Services, Arnstadt**



**5.700 m<sup>2</sup> protection from frost/dew corrosion and microbiological attack without the need to put up a scaffolding, realization the 09.09.2011**



## 3.1. Application examples: Concrete upgrade and soil protection

New projects with silicate technology products

### **Polished design concrete floor**

**METS**  
FLOOR CONCEPTS



**Design concrete floor (DCF) for private villas, offices and warehouses secures innovative surface protection with Sinnofloor and Sinnodur Concrete for easy to clean and oleophobic properties with excellent resistance**



## Advantages silicate technology

- Long lasting Inorganic binder (no biodegradation), watertight
- Crack- and tension free
- High temperature stable
- High resistant, acid-proof binder
- Waterproofing, reprofiling and / or glue
- Excellent adhesion also with umidity, dusty- or complicated geometries
- Comfortable, secure an easy handling by machine- or hand application on site
- Application indipendent from climate- und environment conditions
- Excellent environmentally friendly for the whole life cycle



Thank you very much for your attention!

**SINNOTEC Innovation Consulting GmbH**

**Dr. Jörg Rathenow**

**Schäferweg 8**

**D-65207 Wiesbaden**

**Germany**

**Tel.: +49 6127 916 0374**

**Fax: +49 6127 916 0375**

**Mobil: +49 160 366 3860**

**Skype: jrathenow**

**E-Mail: info@sinnotec.eu**

 **LOEWE – Landes-Offensive zur  
Entwicklung Wissenschaftlich-  
ökonomischer Exzellenz**



**HessenAgentur**

HA Hessen Agentur GmbH



EUROPÄISCHE UNION:  
Investition in Ihre Zukunft  
– Europäischer Fonds  
für regionale Entwicklung.



Hessisches Ministerium  
für Wirtschaft, Verkehr  
und Landesentwicklung

Gefördert durch:



aufgrund eines Beschlusses  
des Deutschen Bundestages





### 3.3. Application examples: Corrosion protection

New projects with silicate technology products

#### **Corrosion protection on steel : HKM high temperature steel production**

**KS Karl Schumacher**  
Maschinenbau und Metallspritzwerk



**Corrosion protection on steel for coal quenching machine (sulfuric acid attack, 600°C, test start 15.08.2011, fotos from 23.11.2011: results better than flame spraying of metall alloy)**



### 3.3. Application examples: Corrosion protection

New projects with silicate technology products

#### **Corrosion protection on steel : HKM high temperature steel production**

 **Karl Schumacher**  
Maschinenbau und Metallspritzwerk



**Stree test with high temperature: heating to 600-800°C and half of plate cooled by imersion in water. Result after 6 cycles: No cracks, no delamination, no corossion!**

### 3.3. Application examples: Corrosion protection

New projects with silicate technology products (AIF ZIM project)

#### **Fire protection foam for steel fire extinguisher pipelines for tunnels**



Porous matrix of silicate mortar, IFF Weimar

**High temperature mortar based on silicate technology with foam structure as fire protection up to temperatures of 1.300°C**

## 3.4. Application examples: construction materials

### New projects with silicate technology products **OEM coating of concrete pipelines and channels**



**Process integration at customer side, definition of machine design,  
Realized the 16.07.2009**

## 3.2. Application examples: Waterproofing and construction chemicals

Already realized projects with new silicate technology products  
**BV Bad Kissingen**



**260 m<sup>2</sup> wall surface outdoor rebated the 05.10.2003 with cold weather conditions (5-10°C)**

**Observation after 6 weeks, water filling in January 2004.**

**Result: excellent high stability**



## 3.1. Application examples: Concrete upgrade and soil protection

New projects with silicate technology products

### **Floor coating scating arena Dresden**



**Renovation of a scating arena for the German champion pair, very fast grinding after only 3 hours, realization the 28.09.2009**