

# **Self Healing Concrete(SHC)**

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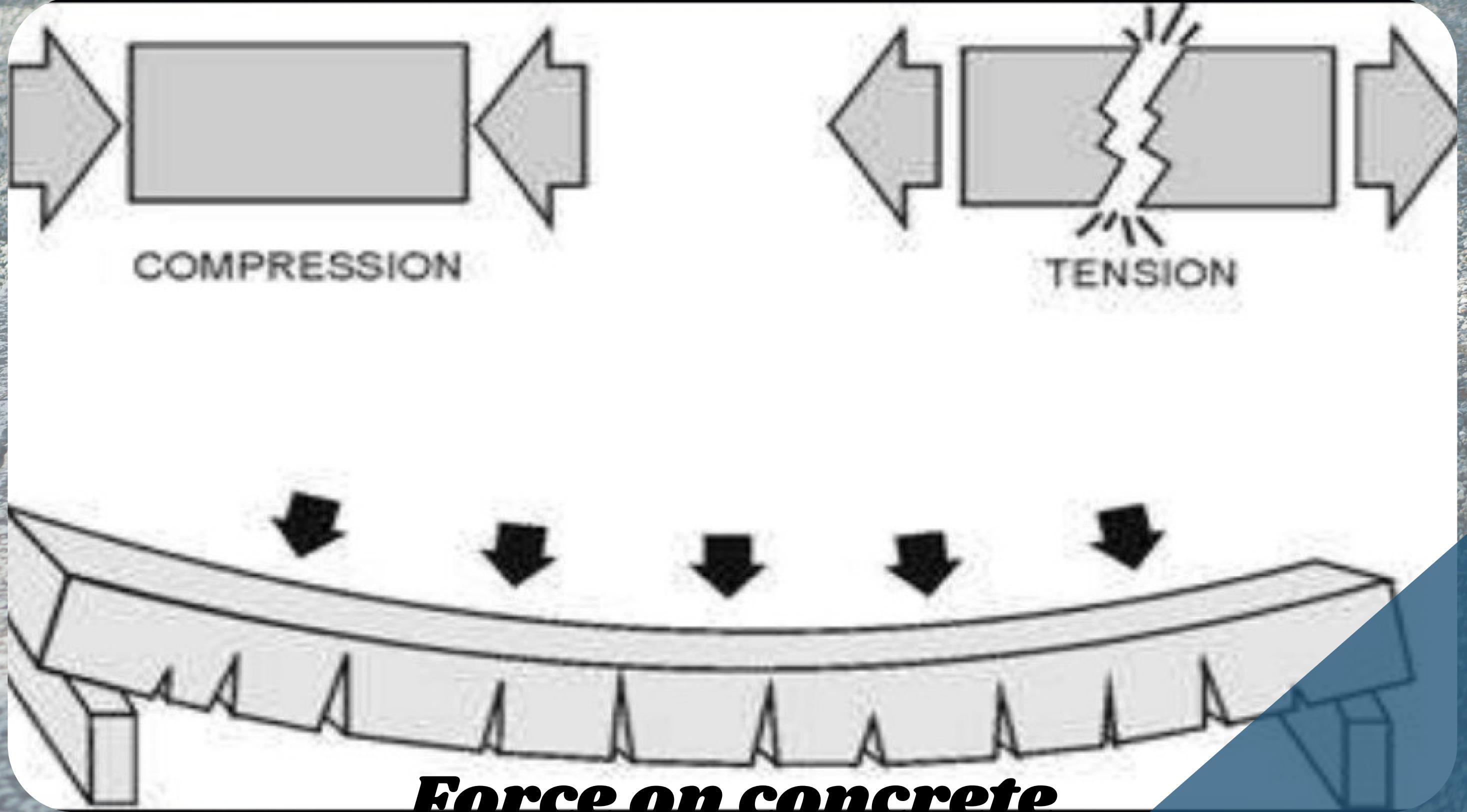
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# **Introduction:**

***Definition :- Self healing concrete is a concrete which heals itself when it comes in contact with air and water, it produces lime on outer layer of concrete.***

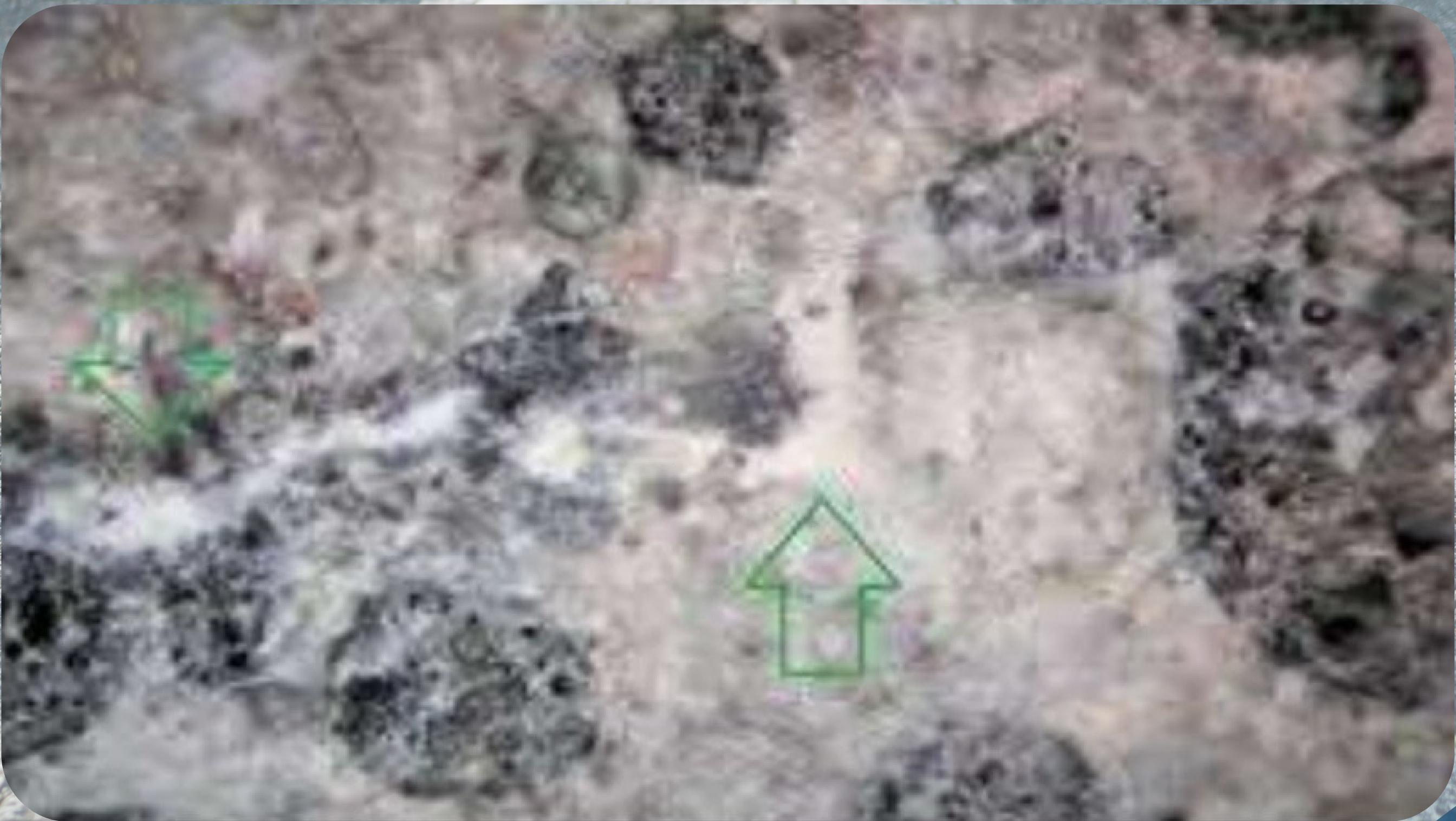
- \* ***In most of the traditional concrete mixtures 20-30% of the cement is left unhydrated.***
- \* ***If cracking of the concrete occurs, unreacted cement grains may become exposed to moisture penetrating the crack.***
- \* ***In that case the hydration process may start again and hydration products may fill up and heal the crack.***

# Necessity





***Concrete with Reinforcement***



***Lime filled in cracks***

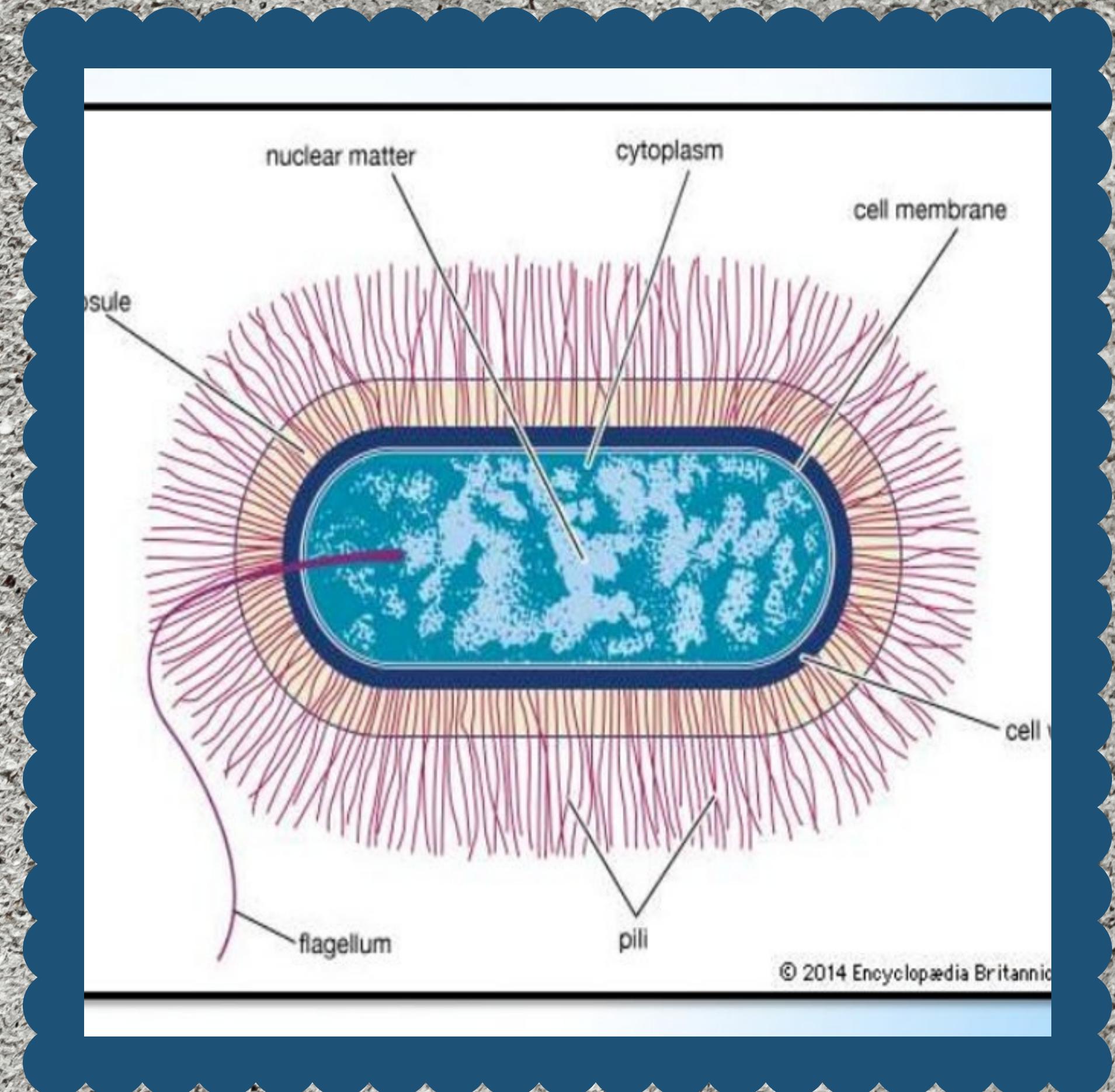
# ***What special present in Self Healing Concrete(SHC)***

***There are two things present in self healing concrete .***

- 1) The special bacteria that has to resist the alkalinity and the mechanical stress of concrete.***
- 2) The chemical precursor to activate the bacteria.***

# Bacteria

*It contains  
outer layer of  
thin wall, which  
resists sunlight  
, chemical  
exposure etc.*



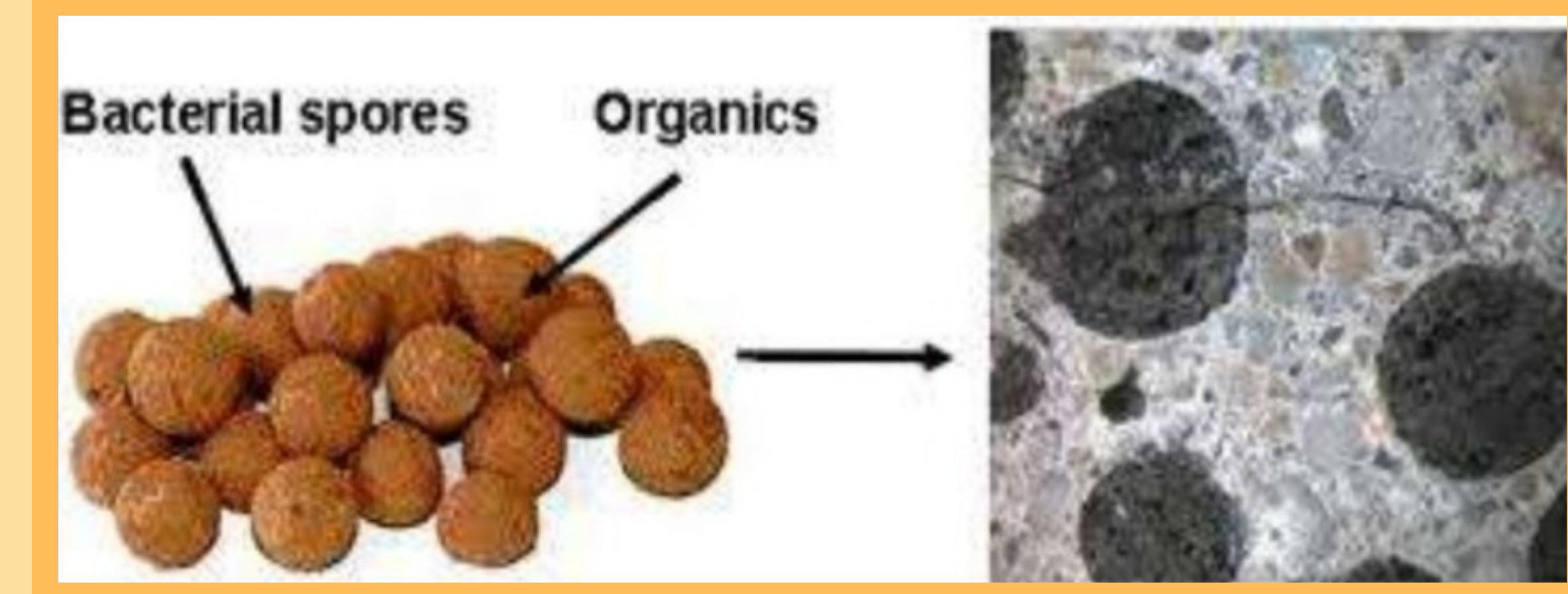
*In 1877,  
Ferdinand Cohn  
claimed that with  
a bacteria known  
as "Genus  
*Bacillus*" concrete  
could be healed.*



# Mixing

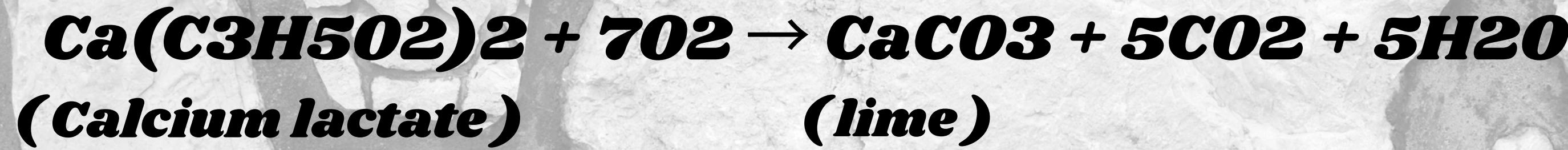
**When spores fine aggregate, coarse aggregate and cement are mixed together, which results in Self Healing Concrete.**

**\*But while mixing one precaution is taken that bacteria and cement are not allowed to mix together with the help of clay pellets.**



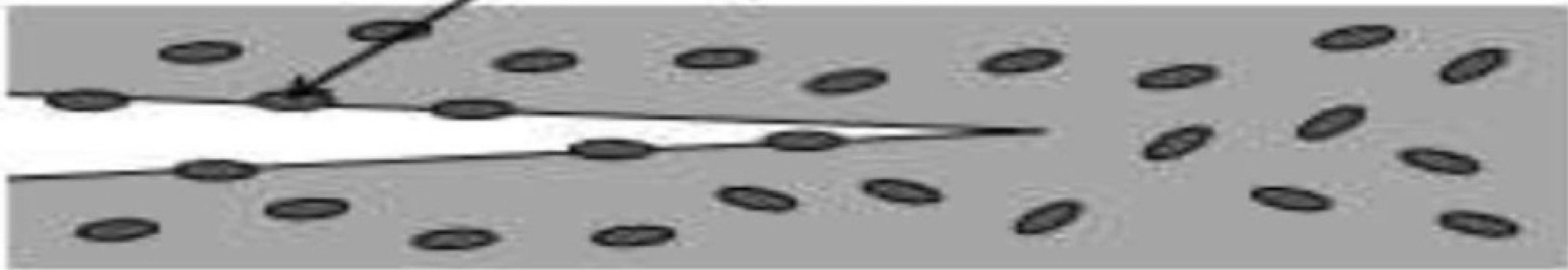
# *Working:*

- *Self-healing concrete is a product that will biologically produce limestone to heal cracks that appear on the surface of concrete structures.*

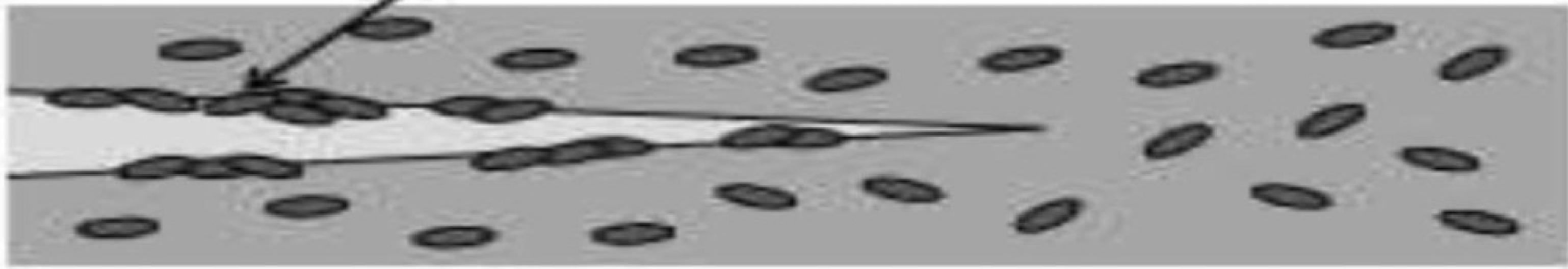


- *Specially selected types of the bacteria genus **Bacillus**, along with a calcium-based nutrient known as calcium lactate, and nitrogen and phosphorus, are added to the ingredients of the concrete when it is being mixed.*

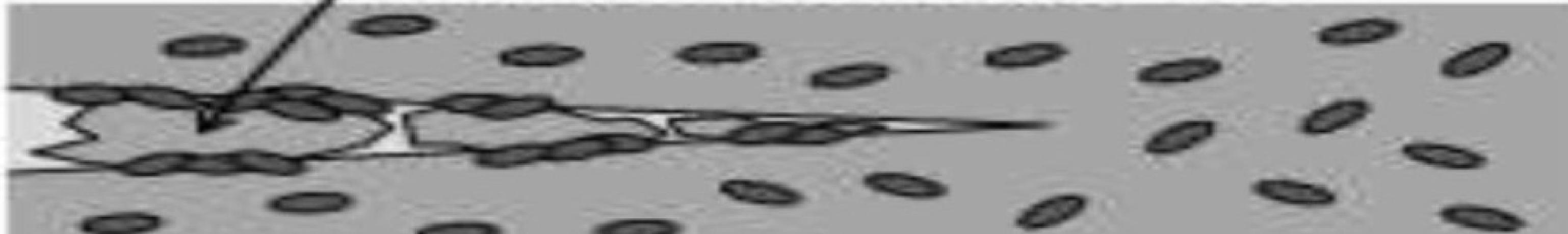
Crack exposes bacteria



Bacteria multiply when water fills crack



Bacteria produce healing products



# *what is happening inside Self Healing Concrete(SHC)*

- *The cracks are formed on the surface of concrete due to many reasons like shrinkage, inadequate water for hydration...etc.*
- *The water is deliberately forced into the cracks and the precursor is activated.*
- *The activated precursor in turn induces the bacteria to react with the precursor and form a base of calcium carbonate called as limestone and the crack is filled up.*

# **Testing on Self Healing Concrete :**

- In 2011, Jonkers and his team is doing testing and case study on self healing concrete.***
- A small structure or part of a structure will be built with the self-healing material and observed over three to five years.***
- Structures will be fitted with some panels of self-healing concrete and others with conventional concrete so that the behaviour of the two can be compared.***
- Cracks will be made in the concrete that are much larger than the ones that have healed up in the laboratory to determine how well and fast they heal over time.***



**HENK JONKERS**

# *Advantages*

- 1. Helps to fill the cracks .***
- 2.Improvement in compressive strength of concrete.***
- 3. Better resistance towards freeze thaw attack reduction.***
- 4.Reduction in permeability of concrete.***
- 5. Reduction in corrosion of reinforced concrete.***
- 6. Helps to reduce maintenance and repair.***

# *Disadvantages*

- 1. Cost of self healing concrete is double than conventional concrete.**
- 2. Growth of any bacteria is not good in any atmosphere media.**
- 3. There is no IS code or other code is available.**
- 4. Investigation of calcite precipitation is costly studied.**
- 5. Skilled labour is required.**

# *Applications*

- ***Self healing concrete can be used for sectors such as tunnel-lining, structural basement walls, highways, bridges, concrete floors and marine structures.***
- ***This is new technology can provide ways to durable roads.***
- ***High strength buildings with more bearing capacity.***
- ***Long lasting river banks.***
- ***Erosion prevention of loose sands.***

# **Conclusion**

- ***Hence Self healing Concrete is cracks resistance.***
- ***protects concrete and Reinforcement from cracks and from corrosion .***
- ***increase the strength as compared to conventional concrete.***

*Thank you*