

TECH OFFER

Solution to Repair Concrete Cracks, Mitigate Rebar Corrosion and Concrete Carbonation



KEY INFORMATION

TECHNOLOGY CATEGORY:

Materials - Composites

Chemicals - Polymers

Chemicals - Coatings & Paints

TECHNOLOGY READINESS LEVEL (TRL): **TRL7**

COUNTRY: **SINGAPORE**

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OVERVIEW

Concrete deterioration caused by cracking, carbonation, and rebar corrosion represents a multi-billion-dollar global challenge. The global concrete repair market is valued at approximately USD 20 billion. Current methods are often labour-intensive, disruptive, or temporary, creating a strong demand for durable, cost-effective, and sustainable repair solutions. This innovation addresses these needs with a two-part treatment system that restores durability and prevents further structural damage:

- **Water-based Concrete Sealer:** Applied directly to concrete and steel surfaces, it prevents the ingress of water and corrosive agents (e.g., chlorides). This reduces the rate of concrete carbonation and rebar corrosion, while also functioning as an anti-corrosion coating for steel reinforcement.
- **Micro-cementitious Crack Injection Sealant:** A flowable, non-shrink material designed for sealing narrow concrete cracks (≥ 1.0 mm). When injected into damaged concrete, it consolidates the structure, re-alkalises adjacent carbonated concrete, and protects embedded steel rebars. By reinstating the passivating layer around embedded bars, it slows corrosion and

reduces the likelihood of further cracking. Unlike traditional polyurethane injections, it provides durable, long-lasting repair without shrinkage.

Both the water-based sealer and micro-cementitious sealant can be used independently or in combination, depending on the protection and repair requirements.

This technology is available for R&D collaboration, IP licensing, and test-bedding with industrial partners in the construction and infrastructure sectors.

TECHNOLOGY FEATURES & SPECIFICATIONS

The key technical advantages of this solution include:

- **Two-part solution** for crack sealing and concrete carbonation treatment
- **Durable & long-lasting repair:** Flowable, non-shrink cementitious sealant for injection grouting
- **High penetration:** Effectively seals cracks ≥ 1 mm in concrete and mortar
- **Re-alkalisation:** Restores the passivating layer around rebars to prevent corrosion
- **Protective barrier:** Sealer reduces ingress of water and corrosive chemicals
- **Strong adhesion:** Bonds directly to cement, penetrates pores, and will not crack, peel, or delaminate
- **Environmentally friendly:** Low odour, VOC-free, water-based formulation

POTENTIAL APPLICATIONS

This solution can be applied across the construction, building restoration, and conservation industries. Key applications include:

Repair of cracking and spalling concrete caused by carbonation

- Restores the protective alkaline layer around steel reinforcement
- Mitigates further corrosion and expansion of rebars, preventing progressive cracking of concrete

Preventive treatment for newly placed concrete in aggressive environments

- Provides protection for structures in high-risk areas such as coastal regions, where exposure to moisture, chlorides, and carbonation accelerates deterioration

UNIQUE VALUE PROPOSITION

Conventional repair methods for reinforced concrete structures, such as removing damaged concrete or applying polyurethane injections, are often costly, disruptive, and temporary. In contrast, this solution:

- Preserves existing concrete by restoring alkalinity in-place without removal
- Reduces rebar corrosion risk, extending the service life of structures
- Delivers a long-lasting, non-shrink repair that aligns with sustainability goals