

SMART CEMENT FOR NOVEL MONITORING SYSTEM



Thanyarat Buasiri, Karin Habermehl-Cwirzen, Andrzej Cwirzen

Projektets syfte och deltagande organisationer:

Development of a novel monitoring system for concrete structures which will be reliable, easy to install and durable by :

- Determination of dependency between various load factors and measurable electrical response of solidified matrixes produced from SmartCem binder
- Development of prototype monitoring system based on application of SmartCem binder for concrete structures.
- Full scale pilot application and verification of laboratory test results.

Organizations involved: Luleå University of Technology, Chalmers University of Technology, Vinnova and Trafikverket.

Vad och vilka behövs för att nå hela vägen till innovation?

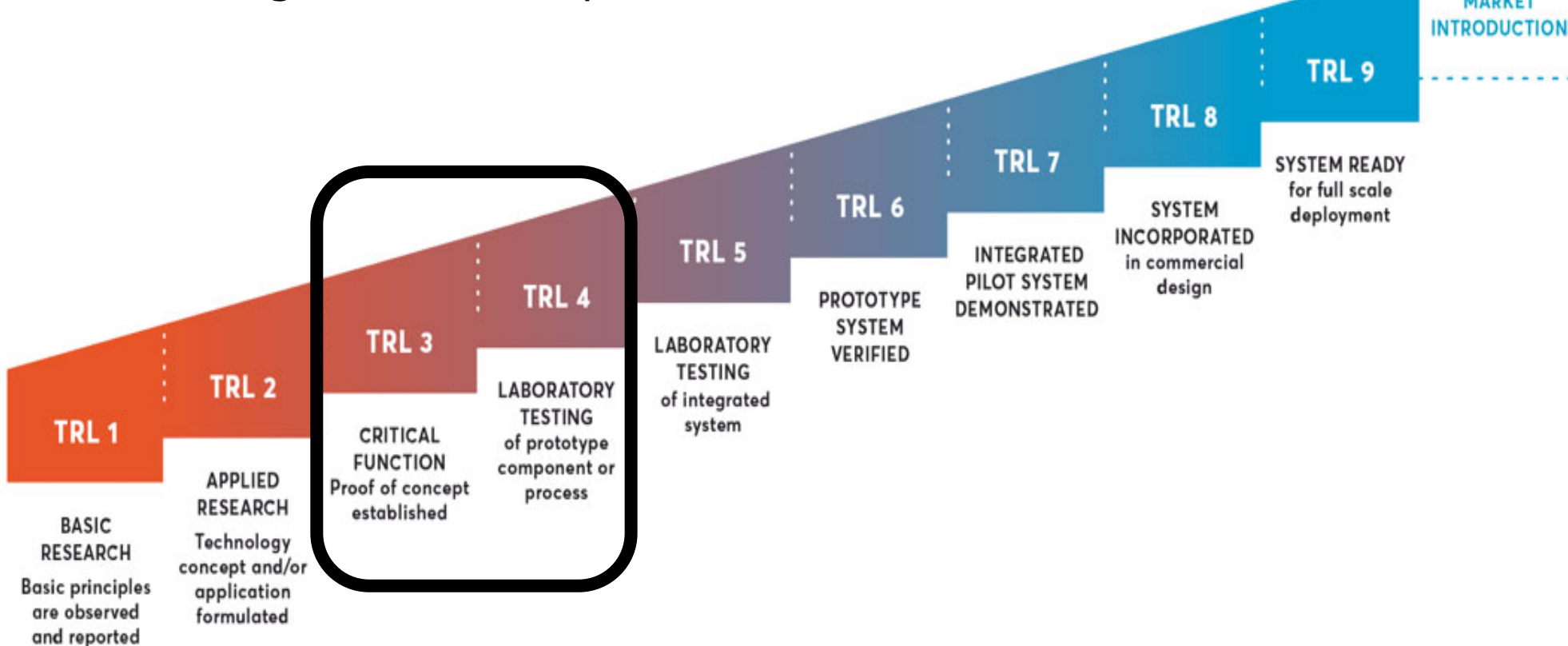
- Chalmers University will assist in testing related to corrosion and chloride penetration.
- Trafikverket will provide access to one existing structure for planned field testing.



Innovation betyder förnyelse. Vari ligger det nya?

- SmartCem is a new conductive binder material which is carbon nanomaterials directly synthesized on the surface of normal cement particles.
- SmartCem/cement composite has a sensing capability under various environmental effects and from nano-scale up to macro-scale.
- SmartCem sensor is easy to install and compatible with concrete structures.

Markering på TRL-skalan visar var projektet befinner sig i innovationsprocessen

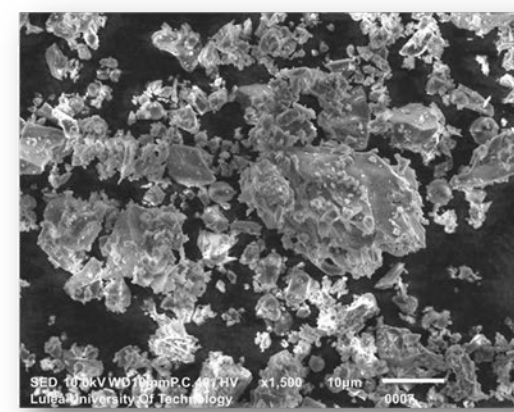
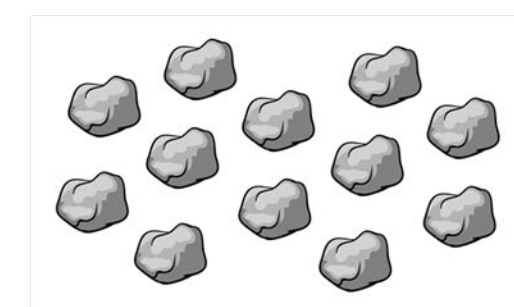


Mål i InfraSweden2030 som projektet avser bidra till:

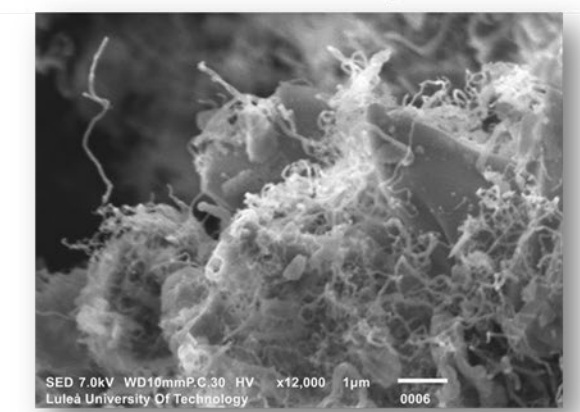
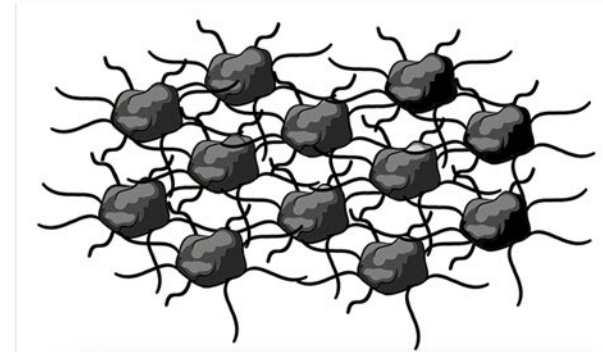
This project will contribute

- To elongate the service life span of existing transportation concrete structures.
- Will lower monitoring and maintenance costs of new built structures in Sweden.
- To elongate the service life span of new transportation concrete structures.
- Enable early and easy detection of damage
- Evaluate the health of a concrete structure online – wherever and whenever you wanted online.

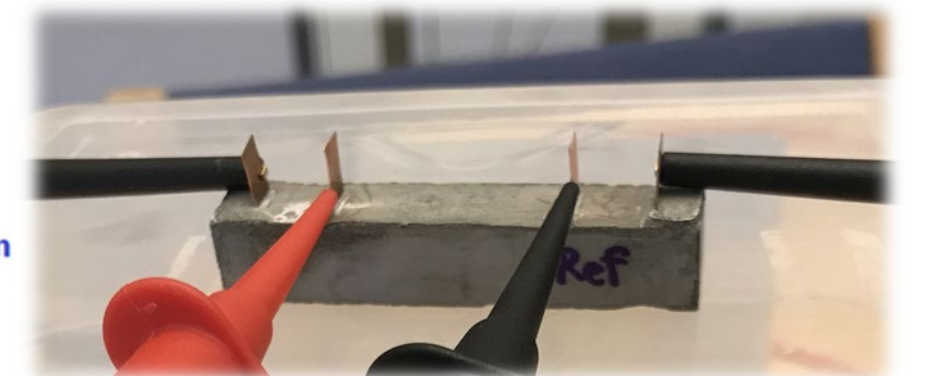
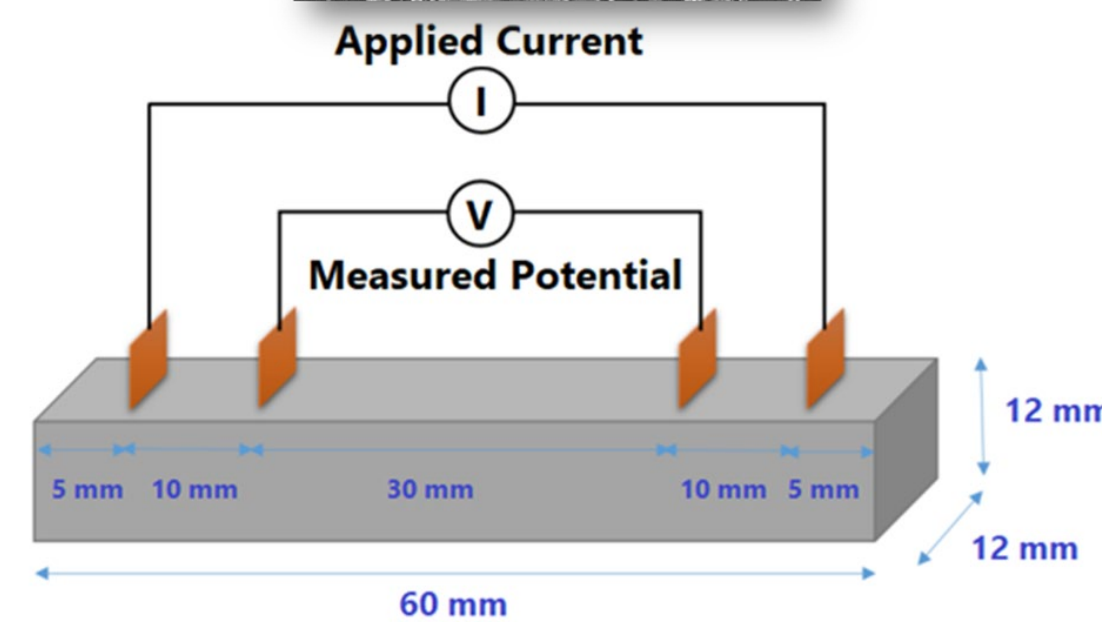
Pristine Cement Particles



Modified Cement Particles (SmartCem)

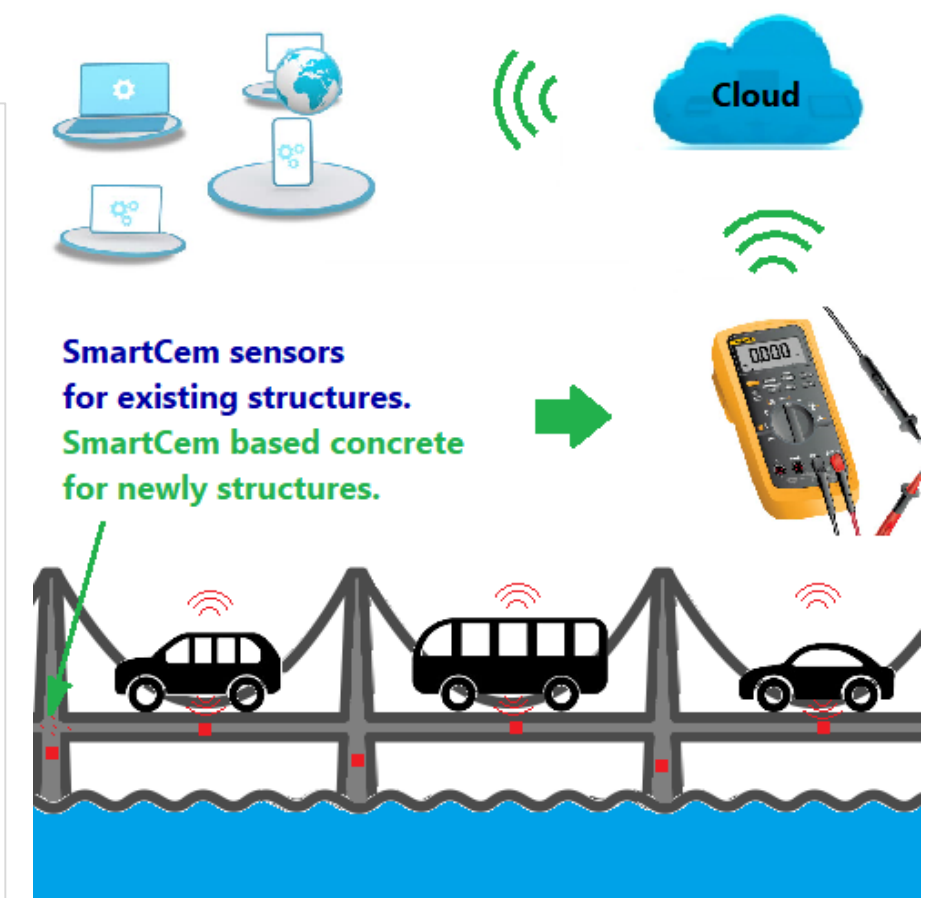


CVD



Förväntade resultat:

- Use SmartCem binder either for sensors or parts of new concrete structures to setup a new monitoring system.
- To create self-monitoring systems with wireless connection for online monitoring.



Redan uppnådda resultat:

- Synthesized SmartCem, which contains carbon nanomaterials on the cement particles, exhibiting conductive properties.
- Find the reliable method to measure the electrical resistivity of SmartCem/Cement composites.
- Find the threshold amount of SmartCem binder which has sensing capability under normal environment.

Förväntade nyttor och för vem:

- Reduce maintenance costs of concrete structures in Sweden.
- Transportation sector or Government can use this new monitoring system to detect damages in infrastructures which are not or not easily accessible.