

TECH OFFER

Microcapsule-Based Self-Healing Smart Coating for Corrosion Protection



KEY INFORMATION

TECHNOLOGY CATEGORY:

Chemicals - Coatings & Paints

Materials - Nano Materials

Manufacturing - Surface Finishing & Modification

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

COUNTRY: **UNITED STATES**

ID NUMBER: **TO174819**

OVERVIEW

Anti-corrosion coatings have attracted tremendous attention due to their significant safety, financial, and environmental impacts. However, the protective coatings are highly susceptible to damage during transport, installation, and service. The detection of initial micro-cracks is very difficult, but the propagation of corrosion can be quite fast. Therefore, smart coating with self-healing function is a promising route to address the above challenges.

The technology owner has developed a polymer-based hollow microcapsule that can release the active ingredients in response to external stimuli. Microcapsules encapsulated with corrosion inhibitors can be added as anti-corrosion additives in coating primer. In the presence of damage, microcapsules get activated and release corrosion inhibitors directly onto the corroding site to prevent the corrosion. This self-healing anti-corrosion coating can effectively extend materials' lifetimes, reduce maintenance expenses, and enhance public safety. The advanced microcapsule technology can also largely reduce the content of toxic corrosion inhibitors by 90%, enabling an environmentally friendly coating solution.

The technology owner is interested in IP licensing and R&D collaboration with industrial partners who are seeking self-healing smart coatings for corrosion protection. The microcapsule technology is also available for co-innovation in other applications, such as anti-fouling and agricultural pest control.

TECHNOLOGY FEATURES & SPECIFICATIONS

The self-healing smart coating using microcapsule technology has the following features:

- Prevent corrosion even in case of pinhole damage, cracking, and scratching
- Preserve corrosion inhibitors in the coating to prolong the functional life
- Pre-synthesized microcapsules can be encapsulated with various corrosion inhibitors
- Cost-effective coating formulation with less corrosion inhibitor
- Environmentally friendly coating without heavy metals
- Adaptable to existing coating process without additional equipment

POTENTIAL APPLICATIONS

This technology can be applied to metallic structures that require heavy duty corrosion protection. The potential applications include but are not limited to:

- Buildings and infrastructure (bridges and towers)
- Underground storage tanks and buried pipelines
- Offshore and submarine (ship hulls and underwater pipelines)
- Chemical and power plants (refining and processing equipment)
- Overhead distribution systems (electricity and telecommunication)
- Hot water and wastewater treatment facilities

UNIQUE VALUE PROPOSITION

- Customised formulations for different applications
- Reduce the content of corrosion inhibitors (~20% cost reduction)
- Increase the coating's functional life (2x life)
- Reduce maintenance costs
- Environmentally friendly

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