An Inorganic Composite Coating for Pipeline Rehabilitation and Corrosion Protection

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Main Objective

This project was awarded to Rutgers University in order to develop an inorganic coating composite for corrosion protection and rehabilitation of pipeline in aggressive environments. We propose to use nano-modification and fiber reinforcement to improve the performance of inorganic coating as corrosion barrier and strengthening system for composite repair of pipeline.

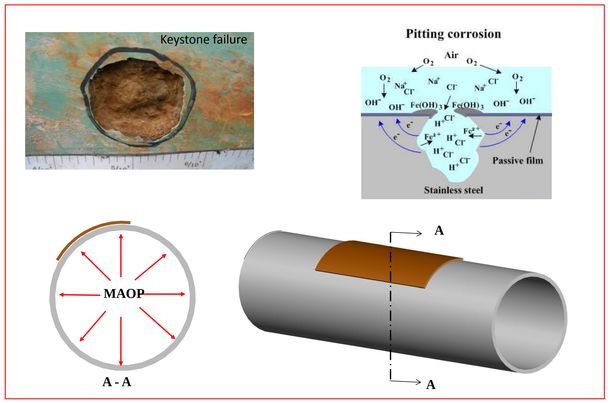

Figure 1. Pipeline Corrosion Failure and Repair.

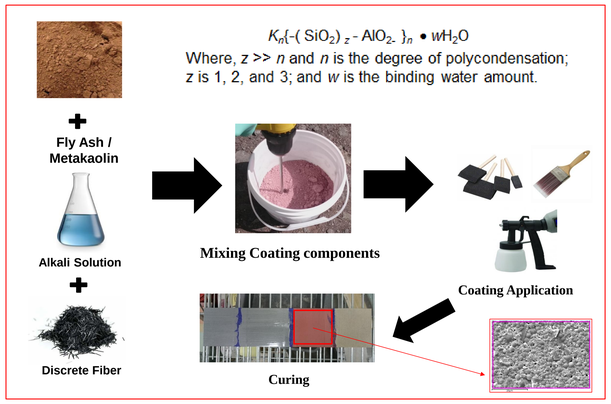

Figure 2. Inorganic Coating Composite.

Project Approach/Scope

- Development of Inorganic Coating Formulations
- Accelerated Corrosion Testing of Coating
- Durability and Adhesion Testing of Coating
- Shear Testing of Coating with Composite Repair
- Analytical Study of Pipeline Strengthening System

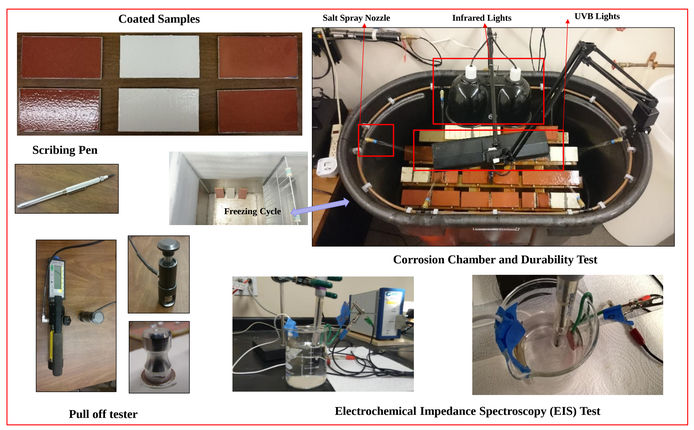

Figure 3. Electrochemical Measurement;
Durability and Adhesion Strength after Accelerated Corrosion.

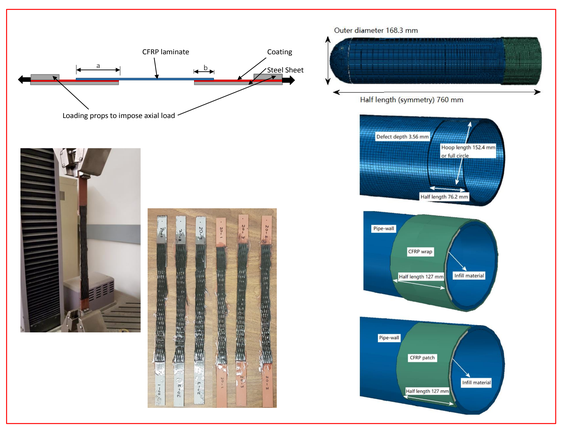

Figure 4. Bonding Strength between Coating and CFRP;
Finite Element Analysis of Composite Repair.

Results to Date

- Geopolymer coating was made using alkali activation and fiber.
- The effectiveness of nano-modification was observed with variation.
- Coating can be used with CFRP for composite repair of pipeline (wrap repair vs. patch repair).

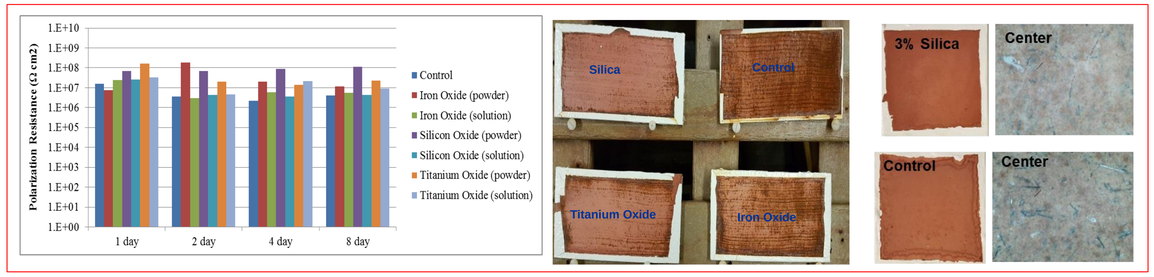

Figure 5. Left: Polarization Resistance from EIS Test; and Right: Durability Test Results.

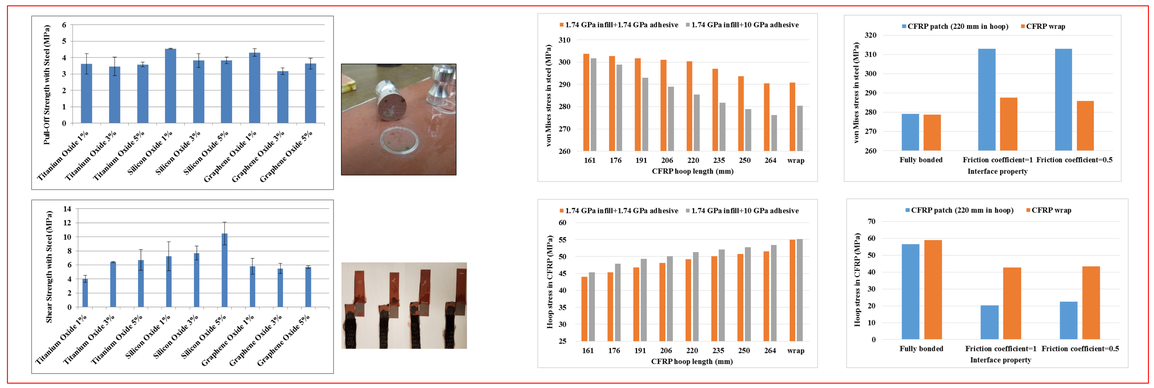

Figure 6. Left: Bonding Strength Test Results; and Right: Stresses in Steel and CFRP under MAOP.

Acknowledgments

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References

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