Silanes on Sand Aggregate Improve Concrete’s Early Strength

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Concrete: Why Early Strength?

Application: Home and building foundations, concrete molds
Problem: Current Concrete does not last and produces 8.6% of CO₂ emissions.

Long Term Goals:
- Greener city and community infrastructure
- Self-Healing, Carbon-Negative Concrete

Summer Research Goals:
- Understanding Concrete Surface Chemistry
- Exploring Silane and Zn(Cyclen) functionalized concrete

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Big Picture: Zn(Cyclen) Tethered GPTMS Sand

The Cast: Silanes Attached to Sand

The Motive: Concrete Strength Tests

Concrete Strength Questions

What structurally is causing increased strength in epoxy terminated silane GPTMS?

Does Zn(Cyclen) GPTMS tethered have greater early strength than other samples?

Methods

1st Piranha Cleaning Sand & Glass
- 3:1 18M H₂SO₄ & 30% H₂O₂
- Cleans off Organics!

2nd Silane Treating Sand & Glass
- 4 hr sonication in silane solution
- Bonds Silane to sand surface!

Exploiting Early Concrete Strength of Zn(Cyclen) Tethered GPTMS Sand

UN Goals: Classroom Connections

Acknowledgments & References

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References: