



Shrinkage Reducing Additive

Airable Research Lab has synthesized a soy-based shrinkage reducing additive (SRA) for concrete. Concrete shrinkage causes cracks in cement structures, and over the last couple of decades, concrete suppliers have been turning to SRAs to minimize shrinking and the associated strain and damage. Most SRAs are sourced from the products of steam cracking of a petroleum feedstock. However, there are growing concerns about the environmental impacts of petroleum-based materials, as well as the fragile supply chains of these materials. With these challenges in mind, Airable produced a bio-based SRA that can replace petroleum-based SRAs in formulations.

THE TECHNOLOGY

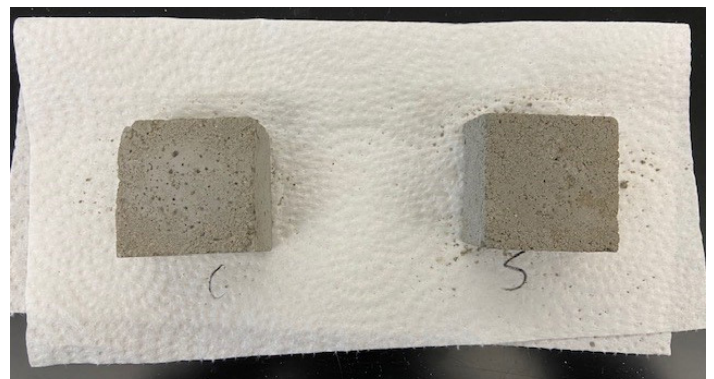
As excess water evaporates from a newly poured concrete surface, air-water interfaces are established within the capillaries and pores in the cement paste. Water has a high surface tension that stresses and closes the capillaries and pores, causing the cement to shrink. SRAs work by interfering with the surface chemistry of the air-water interface, reducing surface tension effects.

In the Airable formulation, soybean fatty acid has been functionalized to become water-soluble and to decrease the surface tension at the water-air interfaces. The process also allows the SRA to withstand the highly basic environment (up to a pH of 13) of setting concrete.

Airable has developed and demonstrated the final product.

BENEFITS

- Derived largely from biological substances, with a composition of up to 72% soybean-derived products
- Drop-in replacement for currently used SRAs
- 60% reduction of interfacial tension
- Up to 80% reduction in internal strain and shrinkage
- Minimal impacts on concrete set time and cure strength



Airable conducted proof-of-principle evaluations of the SRA formulation.

