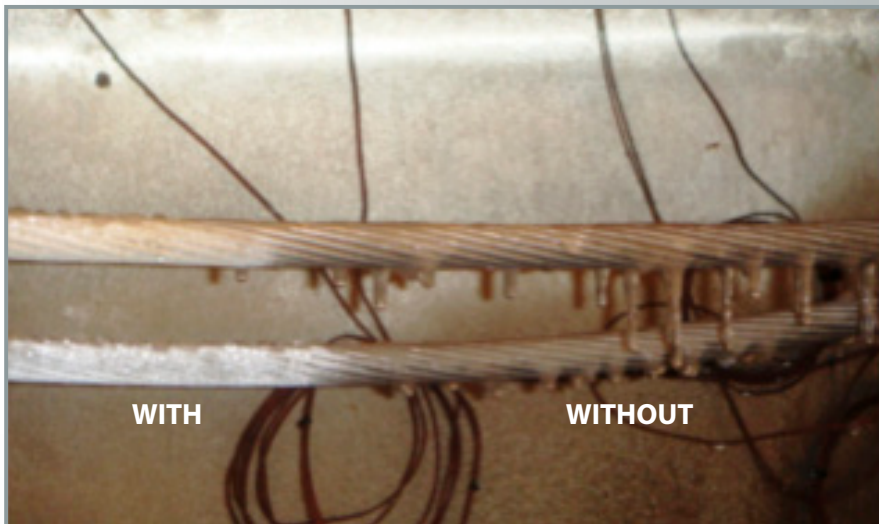


Coatings to Deter Ice Formation

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Technology Summary

Icing of power lines and other structures caused by freezing rain events occur annually in the United States and lead to severe and prolonged power outages. These outages cause untold economic losses for businesses and personal distress for families.

Researchers at ORNL have developed a superhydrophobic coating with remarkable water repellency and anti-icing properties that can be sprayed or painted onto high-tension power lines and pylons. The coatings have demonstrated some of the highest water repellency properties ever reported. These coatings significantly reduce ice accumulation on structures.

The coating material is powder based and is nano-textured to contain sharp features at the nanoscale. For optical quality, the powder grains must be small (<200 nm in diameter), in order to prevent excessive light scattering, which would make the coating appear cloudy. The superhydrophobic powder particles are then uniformly dispersed into a thin film, which is bonded to a substrate to make it durable without substantially reducing the nano-textured features.

To test the coating, researchers simulated ice storm conditions in an environmental chamber. The results showed significant ice formation on untreated power cables, while the cables that had been coated showed only minimal ice formation. Furthermore, the ice that did form on the coated cables did not adhere strongly and was readily removed by tapping the cables.

Advantages

Coatings can easily be sprayed or painted onto virtually any surface. When sprayed on power cables, the ice that does accumulate can be removed easily.

Potential Applications

These coatings can be applied to surfaces and structures on which ice accumulation occurs due to normal or supercooled water contact with subfreezing surfaces. Some potential applications include power-generating wind turbines, solar cell arrays, and naval and other maritime vessels, where excessive ice accumulation on the vessel superstructure can have disastrous consequences.

Patent

John T. Simpson and Brian R. D'Urso, *Superhydrophobic Bandages and Method of Making the Same*, U.S. Patent Application 12/273, 800, filed November 19, 2008.

John T. Simpson and Brian R. D'Urso, *Superhydrophobic Diatomaceous Earth*, U.S. Patent Application 12/273, 823, filed November 19, 2008

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