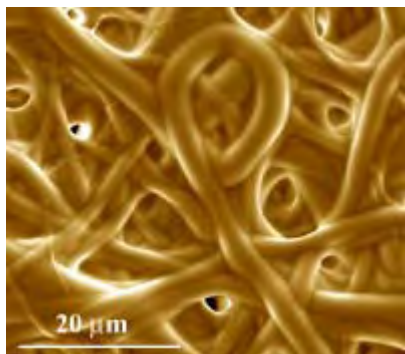




Bring on the Storm

Ice-free power lines



[Click to enlarge](#)
Superhydrophobic polymer fibers
obtained by electrospinning
(under electronic microscope)

January 12, 2010 – It was sheer coincidence that Masoud Farzaneh established the NSERC/Hydro-Québec/UQAC Industrial Research Chair on Atmospheric Icing of Power Network Equipment (CIGELE) only a few months before the ice storm of January 1998. For weeks, images of crystal-coated towers and wires collapsed under the weight of ice dominated the front pages of newspapers across the country, while much of Quebec and Eastern Ontario suffered without power. Over a decade later, Hydro-Québec has spent an estimated \$2 billion to repair and reinforce the damage caused by that storm. It was a perfect demonstration of the need for a solution to the dangers of icy conditions, and Dr. Farzaneh and his team were already hard at work finding one.

Dr. Farzaneh is internationally known for his research in atmospheric ice formation and high voltage engineering. CIGELE's

state-of-the-art lab in the Université du Québec à Chicoutimi's Icing Research Pavilion is the most important of its kind in the world and contains facilities that allow Dr. Farzaneh and his team to recreate ice formation and its effects.

An impressive team of students and researchers led by Dr. Farzaneh set out to create a hydrophobic surface that would repel water, among other related research projects. They gathered inspiration from the naturally hydrophobic surfaces on butterfly wings and lotus leaves. On these, a thin membrane that resembles a bed of nails prevents water from clinging or soaking in. Instead, water forms into beads and slides off without leaving residue.

The researchers turned to nanotechnology to recreate this membrane for other surfaces. Nanotech involves altering material on a molecular scale and allowed the researchers to devise a "lotus effect" of their own. Their first attempts created a superhydrophobic reaction that repelled water, but did not effectively prevent ice accumulation. Over the next five years, the team experimented to find the best chemical composition and manipulated the size, shape and positioning of the "nails" on the coating until they achieved their goal of an icephobic shield that protects against the damage of winter freezes.

There is still work to be done to fine tune the durability and aging of the coating, but anticipation for this breakthrough is high. *Quebec Science* magazine voted it one of the "10 Best Discoveries of 2008," and the potential applications for this coating go far beyond hydro wires and telephone poles. Dr. Farzaneh suggests it could be used anywhere that ice accumulation leads to problems, such as bridges, airplane wings, wind turbines, cars or towers. The potential savings in maintenance and repair that this innovation represents makes it very attractive to industry, and Dr. Farzaneh notes that companies have been enquiring about his progress.

Canadians stand to benefit greatly from Dr. Farzaneh's work. Protecting vehicles and structures from the crippling effects of ice makes safer conditions for anyone near them. In a cold climate like Canada's, that means making conditions safer for everyone. By using modern day technology to battle an age-old problem, the next Ice Age could have a harder time taking hold.