Latest lithium battery technology

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Lithium-ion batteries are the workhorses of home electronics and are powering an electric revolution in transportation. But they are not suitable for every application.

A key drawback is their flammability and toxicity, which make large-scale lithium-ion energy storage a bad fit in densely populated city centers and near metal processing or chemical manufacturing plants.

Now Alsym Energy has developed a nonflammable, nontoxic alternative to lithium-ion batteries to help renewables like wind and solar bridge the gap in a broader range of sectors. The company"s electrodes use relatively stable, abundant materials, and its electrolyte is primarily water with some nontoxic add-ons.

"Renewables are intermittent, so you need storage, and to really solve the decarbonization problem, we need to be able to make these batteries anywhere at low cost," says Alsym co-founder and MIT Professor Kripa Varanasi.

The company believes its batteries, which are currently being tested by potential customers around the world, hold enormous potential to decarbonize the high-emissions industrial manufacturing sector, and they see other applications ranging from mining to powering data centers, homes, and utilities.

"We are enabling a decarbonization of markets that was not possible before," Alsym co-founder and CEO Mukesh Chatter says. "No chemical or steel plant would dare put a lithium battery close to their premises because of the flammability, and industrial emissions are a much bigger problem than passenger cars. With this approach, we"re able to offer a new path."

Chatter started a telecommunications company with serial entrepreneurs and longtime members of the MIT community Ray Stata "57, SM "58 and Alec Dingee "52 in 1997. Since the company was acquired in 1999, Chatter and his wife have started other ventures and invested in some startups, but after losing his mother to cancer in 2012, Chatter decided he wanted to maximize his impact by only working on technologies that could reach 1 billion people or more.

"The intent was to light up the homes of at least 1 billion people around the world who either did not have electricity, or only got it part of the time, condemning them basically to a life of poverty in the 19th century," Chatter says. "When you don"t have access to electricity, you also don"t have the internet, cell phones,

education, etc."

To solve the problem, Chatter decided to fund research into a new kind of battery. The battery had to be cheap enough to be adopted in low-resource settings, safe enough to be deployed in crowded areas, and work well enough to support two light bulbs, a fan, a refrigerator, and an internet modem.

He finally found his partners in Varanasi, Rensselaer Polytechnic Institute Professor Nikhil Koratkar and Rensselaer researcher Rahul Mukherjee. Varanasi, who notes he"s been at MIT for 22 years, says the Institute"s culture gave him the confidence to tackle big problems.

"My students, postdocs, and colleagues are inspirational to me," he says. "The MIT ecosystem infuses us with this resolve to go after problems that look insurmountable."