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Reversible Fabric Warms and Cools

PALO ALTO, CALIF.—A team of researchers at Stanford University has developed a reversible fabric that maintains the wearer's skin at a comfortable temperature regardless of the ambient temperature.

The team, led by Yi Cui, professor of materials science and engineering, designed a double-sided fabric based on

the same material as ordinary kitchen wrap. The fabric can either cool or warm the wearer, based on which side faces out. On one side, a copper coating traps heat between a polyethylene layer and the skin; on the other, a carbon coating releases heat under another layer of polyethylene. The research is published in the journal *Science Advances*. ■



PHOTO CREDIT: YI CUI GROUP

A new textile made from a reversible fabric could warm or cool wearers and keep them comfortable. Two layers of material with different abilities to release heat energy are stacked together and sandwiched between layers of polyethylene.

Nanoparticle Traffic Filters in Buildings

ESPOO, FINLAND—Air filters that efficiently expel nanoparticles could be adopted in buildings. Nearby vehicles create potentially harmful emissions, which enter a building's indoor air unless they are filtered out. VTT Technical Research Centre of Finland and Tampere University of Technology (TUT) have developed a comparison technique that has detected marked differences between the nanoparticle-capturing performance of air filters.

The study did not involve tests of different manufacturers' products. The study included a commonly used F7-class glass-fiber filter, HEPA-class filters, an electret filter and an electrostatic precipitator. The air filters included in the study filter out 50% to 100% of nanoparticles from vehicle traffic.

Differences were observed in the filtration performance and energy efficiency of the filters. "The commonly used F7-class filter removed more than 75% of soot nanoparticles emitted by traffic, which was an acceptable result," said researcher Panu Karjalainen of TUT. "The electrostatic precipitator removed 94%, and the more expensive HEPA-class filters removed 100% of soot nanoparticles. On the other hand, the fiber filter was more efficient than the electric one at removing the very smallest nanoparticles." ■

Cool Roofs and Water Saving Benefits

BERKELEY, CALIF.—A new study by the U.S. Department of Energy's Lawrence Berkeley National Laboratory has found that, in addition to reducing air temperatures, cool roofs can also save water. Based on regional climate simulations of 18 California counties, Berkeley Lab researchers found that the use of cool roofs reduced how much water is needed for urban irrigation.

They can reduce the ambient air temperature from 1°C to 1.5°C (1.8°F to 2.7°F), which leads to less

water being needed for landscaping and other outdoor water uses. The researchers concluded that widespread cool roof adoption could reduce outdoor water consumption by as much as 9%. ■

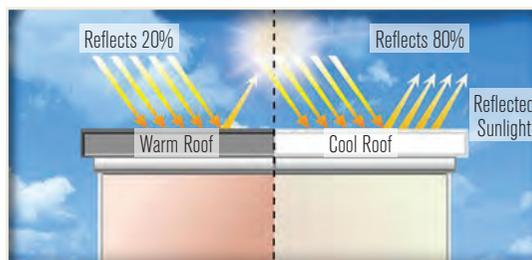


PHOTO CREDIT: LBNL

Graphic depicts the cooling benefits of cool roofs. Recent research has found that cool roofs also lead to reduced water use.

DOE Funding Research to Improve Motor Efficiency

BELOIT, WIS.—Regal Beloit recently announced that its Marathon Motors division has been awarded a U.S. Department of Energy (DOE) grant for research and development to increase energy efficiency in electric motors.

Marathon Motors received \$1 million to develop a rare-earth element-free motor. "The Marathon Motors team will direct its research toward developing a motor that uses soft magnetic composites and grain-oriented electrical steel in a state-of-the-art, conical air gap motor architecture," said Paul Knauer, advanced technology manager, Regal Beloit. "The project aims to improve the efficiency of a 5 kW standard industrial motor from 92% to greater than 96%." ■

GSA, DOE Seek to Improve Efficiency of Federal Buildings

WASHINGTON, D.C.—The General Services Administration and the U.S. Department of Energy (DOE) issued a request for information Oct. 30 for new technology to help improve federal building efficiencies. The request, which is part of GSA's Proving Ground and DOE's High Impact Technology Innovation Catalyst programs, seeks information for behind-the-meter technology to promote energy efficiency at federal buildings, as well as technologies that can identify when smart design buildings are functioning within energy-saving parameters. ■

Passive Solar Windows Heat Up in Cold Weather

GOTHENBURG, SWEDEN—Researchers have developed a way to transform ordinary windows into solar-powered heaters that use solar rays to increase the window's temperature by up to 15°F (8.3°C) in cold weather. The researchers expect that the new solar thermal surfaces will lead to significant energy savings through reduced heating costs.

The new surfaces make use of plasmonic nanoantennas made of nickel-aluminum oxide layers patterned as an array on glass. Electron oscillations on the surfaces of these materials enable the nanoantennas to absorb light, which heats the entire surface. The research, by academics from universities in Sweden, China, Iran and the United States, is published in the journal *Nano Letters*. ■

'Self-Powered' Data Center in Italy

MILAN, ITALY—A new 49 acre (19.8 ha) facility, claimed to be "the world's first self-powered data center," has opened in Italy. The Global Cloud Data Center has its own dedicated hydroelectric plant. Electricity is generated from the water running from the Brembo River through turbines. That power is stored and then injected into the national grid

infrastructure. The hydroelectric system, along with the power from solar panels, can produce up to 90 MW of power. The "river of energy" flows "more or less" constantly, says operator Aruba S.p.A. Other energy-efficiency and sustainability technologies use distinct ducts in the server rack design that aid efficiency by targeting underground-cooled air onto the parts of the rack that need cooling

the most. Also, double insulation with a defrost system is used in the data room construction. ■



One possible layout of Arkup's floating homes.

PHOTO CREDIT: ARKUP

Floating Homes Designed to Withstand Hurricanes

RIJSWIJK, THE NETHERLANDS—A Dutch architect has designed homes located on the water that produce zero emissions and are hurricane-proof. Koen Olthuis, head of the firm Waterstudio, collaborated with start-up company Arkup to design the floating homes. Each unit is about 4,350 ft² (404 m²), with four bedrooms and 4.5 bathrooms. Through a combination of solar panels, as well as water purification and waste management systems, the

residences can operate entirely off the grid. To protect them from severe weather, each home is equipped with shock-resistant glass panels to prevent shattering and a hydraulic self-elevating system that can raise the home in the event of heavy rainfall or a hurricane. Each hydraulic leg can also extend up to 40 ft (12 m). Reportedly the structures can withstand hurricanes up to Category 4 in strength. ■



The Global Cloud Data Center.

PHOTO CREDIT: ARUBA S.P.A.