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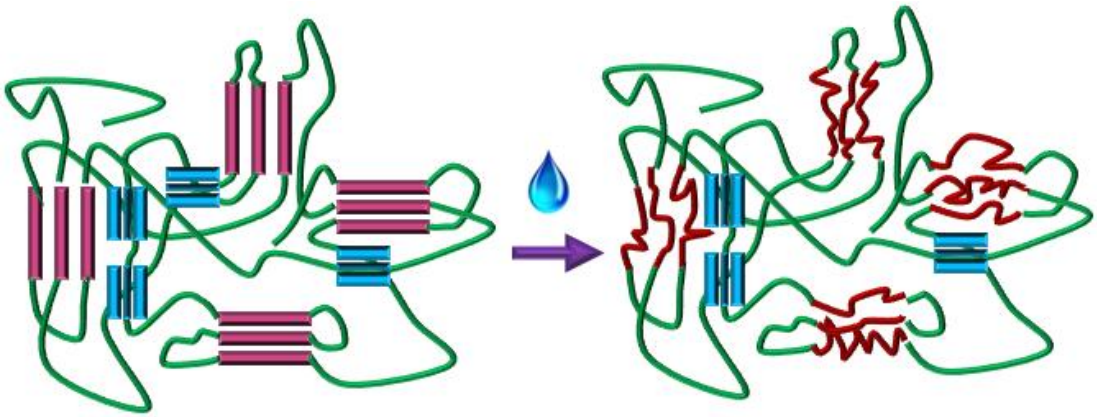


base The Official Journal of BASE

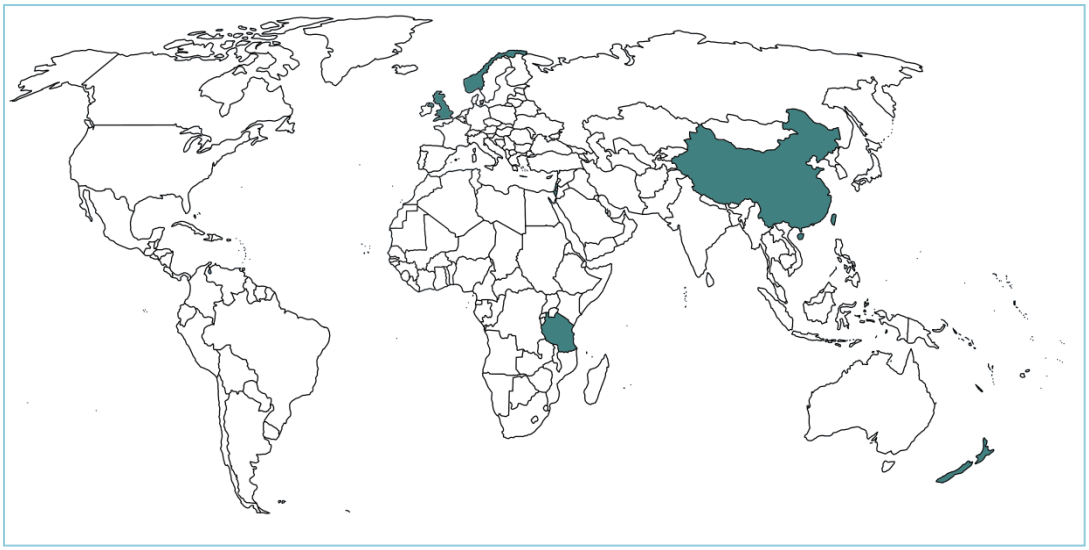
Jerusalem, ISRAEL

Intubation Robot

Imagine what a robotic device crawls into lungs helping the patients breathing. It is possible. In general, to help anesthetized or critically ill patients breathe, flexible plastic tubes are placed into the lungs to maintain an open airway, a procedure known as intubation. For the procedure, physicians are required to look down the throat, and choose between two very similar openings, one leading to the lungs, the other to the stomach. Picking the wrong opening to intubate can lead to death. Moreover, intubation sometimes has to be performed in challenging situations that can make the procedure even more difficult, such as in pathologic obesity, accidental deformation of the airway, in the battlefield, or with fluids such as blood obstructing the way. Ok, scientists now produced a robotic intubation device that can automatically identify the lungs. It is a prototype of the device called the GuideIN Tube has been successfully tested on cadavers at the Hadassah Medical Center in Jerusalem, Israel. To use the device, physicians need first place a beacon of infrared light against the skin in the front of the patient's throat, illuminating the windpipe. Sensors on the device recognize the infrared light as where it should go, and the device automatically moves toward it. Wires on the device control its movements like a puppeteer, pulling it in the correct direction. Hopefully, this new device can save lives of patients with difficult intubation.■

Dar Es Salaam, TANZANIA

Child Labor in Gold Mining



Are the children taken careful consideration for their development all around the world? New York-based Human Rights Watch said children as young as eight years old were working in small mines in Tanzania, Africa's fourth-largest gold producer. They are at risk of injury from pit collapses and accidents with tools as well as of long-term health damage from

exposure to mercury, breathing dust and carrying heavy loads. In Tanzania, child labor is a serious problem in small-scale mines. There are more than 800,000 miners working in small-scale gold operations in Tanzania, thousands of them are children. The Tanzanian government has pledged to end the practice, but Human Rights Watch said it was not doing that enough. On paper, Tanzania has strong laws prohibiting child labor in mining, but the government has done far too little to enforce them. Also, girls who work on or near mining sites sometimes become victims of sexual exploitation and assault.■

Beijing, CHINA

China: No Reach in Middle East

Beijing does not want to do much to influence events in the worsening Syria conflict. As the United States and its allies gear up for a probable military strike on Syria, raising fears of a regional conflagration, China remains firmly on the sidelines, despite it having much more at stake than some other big powers. The Middle East is China's largest source of crude oil. Without it, the world's second-largest economy would shudder to a halt. In the first seven months of this year, China imported about 83 million metric tons (91.49 million tons) of crude from the region, half its total, with top suppliers including Saudi Arabia, Iran, Iraq, Oman and the United Arab Emirates. China insists it is neither backing nor protecting Syrian President Bashar al-Assad, saying it only vetoed U.N. resolutions it thought would worsen the crisis. China's military, despite making rapid progress in stealth fighter technology and launching its first aircraft carrier, is largely untested. Publicly, China

has shown few signs of wanting to get more deeply involved in the Middle East, whether militarily or diplomatically. China has gone through the motions of sending envoys to Syria, and hosting government and opposition officials in Beijing, though some of its diplomatic efforts have come across as insensitive in the Arab world and have provoked a backlash. At some pointS China is going to say: why should the United States was protecting their oil? Peace is expected, but how the peace can be kept?■

Wellington, NEW ZEALAND

The Warmest Winter

The South Pacific nation had its warmest winter this year since a century ago. The average nationwide temperature of New Zealand was 9.5 Celsius (49.1 Fahrenheit) for June, July and August. That's about 1.2 Celsius above average and 0.3 Celsius above the previous record set in 1984, the National Institute of Water and Atmospheric Research said. The winter had a pattern of warmer winds from the north but fewer southerly winds, which typically bring cold air from Antarctica. The global weather remains variable but is in a warming pattern. The weather was a boon for farmers who were recovering from a summer drought. The mild weather allowed grass to sprout in their fields, and skiers had no problem with the weather, either. It has certainly been pleasant because August is usually windy and snowy and cold.■

London, UK

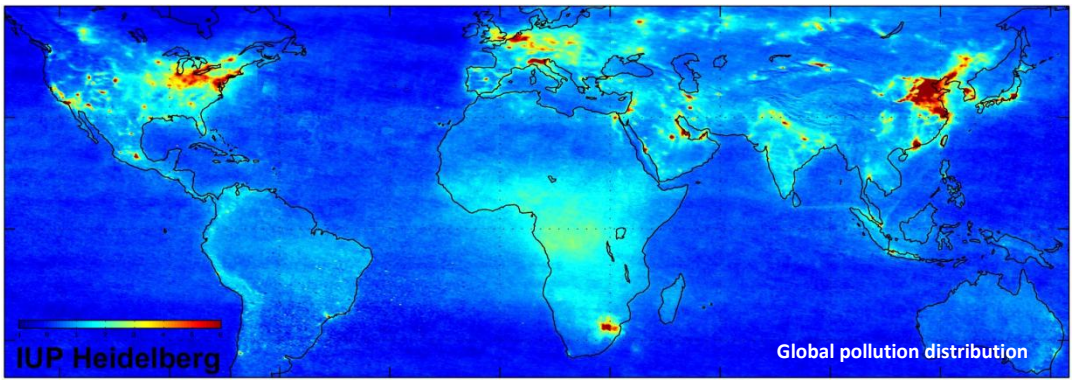
"London Is Burning"

London isn't famous for hot weather, but that may change soon, and not because of global warming: The design of a new skyscraper in the city is melting cars and setting buildings on fire. Local shopkeepers have complained about carpets catching fire and smoldering front doors. A restaurant owner told London news site City A.M. that slate tiles on his doorstep had shattered in the heat. The building designed by internationally renowned architect Rafael Viñoly is a dramatic edifice with curved exterior walls. Built at 20 Fenchurch Street in London's financial center, the 38-story skyscraper is known locally as "the Walkie-Talkie" for its unusual shape. That curvilinear shape is exactly what's causing the problem: The south-facing exterior wall is covered in reflective glass, and because it's concave, it focuses the sun's rays onto a small area, not unlike the way a magnifying glass directs sunbeams onto a superhot pinpoint of light. That same concave shape has been used in the design of solar power plants. A solar dish in New Mexico contains 82 mirrors that focus sunlight onto an engine that contains hydrogen. As the gas expands and contracts from heating and cooling, that motion drives pistons that power a generator that creates electricity. This isn't the first time Viñoly's architecture has raised eyebrows as well as temperatures: His Vdara Hotel in Las Vegas has been criticized for directing sunbeams onto the swimming pool deck that are hot enough to melt plastic and singe people's hair.■

Oslo, NORWAY

World Bank Targets Air Pollution

The World Bank was planning "aggressive action" to help developing nations cut emissions of soot and other air pollutants blamed for causing climate change, in a shift also meant to protect human health and aid crop growth. The bank said it would shift its current policy to insist that projects in future included a component to curb air pollution. The bank would look for new ways to help reduce pollution from public transport, curb methane emissions from rice irrigation, and improve the efficiency of high-polluting cooking stoves and brick kilns. Soot comes from sources ranging from wood-burning cooking stoves to diesel engines. Methane comes from decomposition of plant and animal matter and from farming, for instance from the digestive tracts of cattle and sheep. The focus on short-lived air pollutants is meant to complement efforts to cut carbon dioxide, the main greenhouse gas from human activities that a U.N. panel of climate scientists says is the main cause of global warming. Cutting short-lived pollutants would also protect human health - six million people worldwide die early every year from air pollution.■



EDITOR'S CHOICE

BIOCHEMISTRY

Epigenetics: Selective Class IIa Histone Deacetylase Inhibitors

The development and maintenance of an organism is orchestrated by a set of chemical reactions that switch parts of the genome off and on at strategic times and locations. Epigenetics is the study of changes in gene expression or cellular phenotype other than changes in the underlying DNA sequence. Currently, the class I histone deacetylase (HDAC) inhibitors are popular in biological research, but the elucidation of the molecular mechanisms and therapeutic potential of class IIa HDACs is impaired by the lack of potent and selective chemical probes. A study headed by Dr. Nolan from Tempero Pharmaceuticals, Massachusetts, USA reported their discovery of class IIa HDACs inhibitors that, trifluoromethyloxadiazole (TFMO), which circumvents the selectivity and pharmacologic liabilities of hydroxamates. The authors confirmed direct metal binding of the TFMO through crystallographic approaches and use chemoproteomics to demonstrate the superior selectivity of the TFMO series relative to a hydroxamate-substituted analog. They further apply these tool compounds to reveal gene regulation dependent on the catalytic active site of class IIa HDACs. Their discovery of the inhibitors challenges the design process for targeting metalloenzymes through a chelating metal-binding group and suggests therapeutic potential for class IIa HDAC enzyme blockers distinct in mechanism and application compared to current HDAC inhibitors. These contrasts to the activity of vorinostat provide evidence that class IIa HDACs are not likely to be classical epigenetic enzymes affecting chromatin structure and gene expression in every cell type.■

***Nat Chem Biol* 2013; 9 (5):319**

SOCIETY

Who Earns More in USA: Male or Female Health Care Professionals

Do we really equal? You know the answer. Historically, female physicians have earned considerably less than male physicians, though in the 1990s much of this was attributable to gender differences in specialty choice and hours worked. Nearly 40 years after the adoption of the Title IX Amendments of the US Civil Rights Act, women account for almost 50% of US medical students and more than one-third of all physicians. A study led by Dr. Jena from Harvard Medical School, Boston, USA, presented their data suggest that female physicians currently earn less than male physicians even after adjustment for specialty, practice type, and hours worked. Questions were raised about whether the gender gap in earnings among US physicians has closed over time, particularly compared with the earnings gap for other health care professionals and workers overall. Comparing earnings of male and female physicians over time is important in assessing the impact of policies to promote gender equality among physicians.■

***JAMA Intern Med* 2013, in press**

HEALTH

Fruit Consumption and Risk of Type 2 Diabetes

It is believed that fruits help us build our health body. Who can think about their negative effects on our health? Fruits are rich in fiber, antioxidants, and phytochemicals that have beneficial health effects. However, a recent study led by Dr. Sun from Brigham and Women's Hospital and Harvard Medical School, Boston, USA, observed the associations individual fruits and risk of type 2 diabetes, and they found that greater consumption of specific whole fruits, particularly blueberries, grapes, and apples, was significantly associated with a lower risk of type 2 diabetes, whereas greater fruit juice consumption was associated with a higher risk. The differences in the associations between individual fruits were not accounted for by variation in the glycemic index/glycemic load values of individual fruits. Overall, these results support recommendations on increasing consumption of a variety of whole fruits, especially blueberries, grapes, and apples, as a measure for diabetes prevention.■

***BMJ* 2013; 347:f5001**

Model Tipaerua (Model Canoe), 2002

By Alex Kennedy

Model Tipaerua (Model Canoe), 2002
By Alex Kennedy
Tahiti. Commisioned 2002. Te Papa
Museum of New Zealand Te Papa Tongarewa

Water Triggered Shape Memory Materials

Guoguang Niu *Δ and Daniel Cohn †

SUMMARY: THE SHAPE MEMORY materials triggered by water display advantage over the thermal induced ones because water triggered can eliminate temperature constrains and avoids fast degradation. Here we reported a new strategy of water induced shape memory, in which the formation and dissolution of poly(ethylene glycol) crystal is utilized for the fixation and recovery of temporary deformation of hydrophilic polymer. This water-induced shape recovery is less sensitive to temperature, of which 95% deformation is fixed in circumstance and over 75% recovery is reached even at 0 °C. The material possesses potential applications in biomedical fields, such as artificial lens and smart suture.

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THE TERM "shape memory effect" refers to the ability of a material to be deformed and fixed into a temporary shape, and to recover its original, permanent shape upon an external stimulus (1). Shape memory polymers have attracted much interest because of their unique properties, and applied tremendously in medical area, such as biodegradable sutures, actuators, catheters and smart stents (2, 3). Shape memory usually is a thermally induced process, although it can be activated by light illumination, electrical current, magnetic, or electromagnetic field (4-6). During the process, the materials are heated directly or indirectly above their glass transition temperature (T_g) or the melting temperature (T_m) in order to recover the original shape. Non-thermally induced shape memory polymers eliminate the temperature constrains and enable the manipulation of the shape recovered under ambient temperature (7, 8).

Herein, we report a novel strategy of water induced shape memory, in which the formation and dissolution of poly(ethylene glycol) (PEG) crystal is utilized for the fixation and recovery of temporary deformation of hydrophilic polymer. This water-induced shape recovery is less sensitive to temperature, of which 95% deformation is fixed in circumstance and over 75% recovery is reached even at 0 °C.

Water-driving - shape recovery at ambient temperature has been described (9), which is dependent on the decrease of T_g or the dissolution of PEG segment. However, the recovery rate of these materials also depends on temperature, 70% shape recovery requiring at least 30 °C or even higher temperatures. For some hydrophilic polymers, the samples behave like crystalline materials without water, in which a linear stress-strain relation can be found prior to yielding (10). While with the uptake of water, the behavior of these materials will change to rubbers. Based on this transition, we developed one kind of water induced shape memory materials. This kind of material contains hydrophobic poly(ε-caprolactone) (PCL) or poly(L- lactide) (PLA) segment and PEG segment. PLA or PCL segments bestow the materials the biodegradable properties in physiological conditions. PEG segments are prone to forming crystals in dried materials (Fig. 1A). However when the materials are swollen in water, the PEG crystalline structure is destroyed, and the rubber-like materials are formed (Fig. 1B). These swollen samples can be deformed into different shapes (Fig. 1C). After drying, the PEG crystalline structure restored again, as thus the predetermined shapes are fixed (Fig.1D). These new shapes are stable for a long time at room temperature, and they can recover their original shapes with the disappearance of PEG crystals when immersed into water.

The ability of polymers to form different predetermined temporary

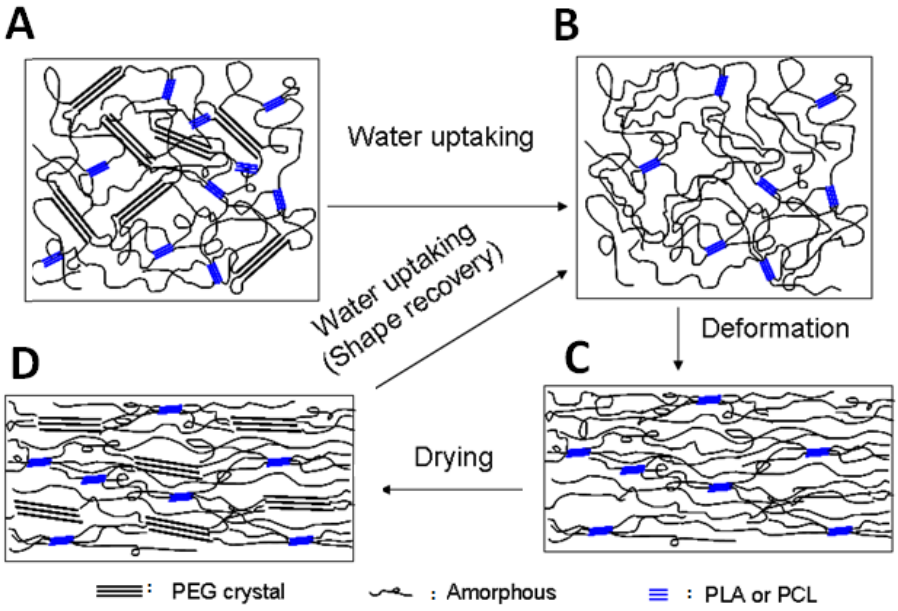

Figure 1. Schematic of water triggered shape memory and restoration. With the uptake of water PEG crystals in material (A) transform into amorphous state (B); and the wet material is easily elongated or deformed (C); after drying, PEG crystals restored and the deformed shape is fixed or memorized (D); with water uptake the reformed material returns back its initial shape.■

shapes and subsequently recover their initial shapes within a wide temperature range by water uptake eliminate the limitation of temperature during the stages of fixation and recovery that enables the materials to be used widely in biomedical fields, such as self-tightening suture, artificial lens, smart stents, and artificial scaffold with complex geometries.■

Conflict of Interests

None

List of Abbreviations

PEG: poly(ethylene glycol); T_g : glass transition temperature; T_m : melting temperature; PCL: poly(ε-caprolactone); PLA: poly(L- lactide)

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