RESEARCH HIGHLIGHTS

Selections from the scientific literature

Nanoparticles stuck on tape

Researchers have found an easy way to deposit metal nanoparticles on a surface — using sticky tape.

Adding nanoparticles to a surface can give it properties such as electrical conductivity. Bartosz Grzybowski at Northwestern University in Evanston, Illinois, and his colleagues showed that when commercial Scotch tape is peeled away, bonds within the tape polymer break and radicals form on its surface. These then react with metal salts to produce metal nanoparticles on the tape.

When the team placed peeled tape into a solution of silver nitrate for several hours, the tape turned yellow-orange — indicating that silver nanoparticles had formed. The silver-coated tape showed antibacterial activity and remained sticky.
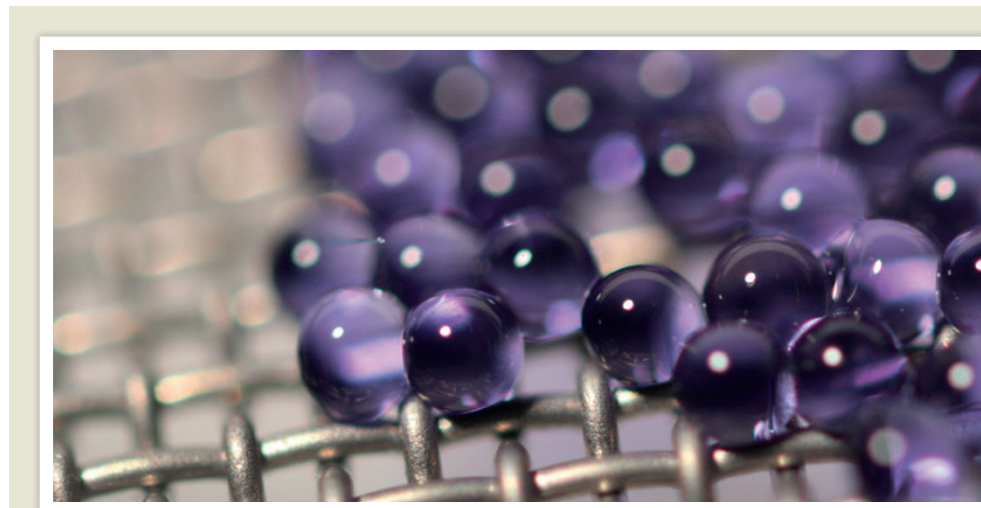*J. Am. Chem. Soc.* http://doi.org/zzn (2015)

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MATERIALS

Capsules collect carbon dioxide

Microcapsules containing a liquid carbonate solvent could capture carbon dioxide from power plants more efficiently than existing methods.

Currently, CO_2 is captured at power plants by passing the flue gas over a solution of liquid monoethanolamine. The liquid is corrosive, forms toxic by-products and must be heated to high temperatures to recover the CO_2 and regenerate the solvent. Jennifer Lewis at Harvard University in Cambridge, Massachusetts, and her colleagues created microcapsules made of a highly porous silicone skin containing a carbonate solvent. These solvents absorb CO_2 slowly, but encapsulation of solvent boosts the absorption rate tenfold (compared to pools of liquid carbonate) by increasing the surface area.

The capsules (pictured) are chemically stable and environmentally benign, and CO_2 can be recovered by modest heating.
Nature Commun. 6, **6124** (2015)

STEM CELLS

Injected cells fix brain injury

Cells derived from human stem cells repair brain damage in irradiated rats, suggesting a possible therapy for survivors of brain cancer.

Radiation treatment of brain cancer can impair memory, attention and learning. Viviane Tabar at the Memorial Sloan Kettering Cancer Center in New York and her colleagues used human embryonic stem cells to make progenitor cells that form oligodendrocytes, which insulate nerve fibres, boosting the speed of electrical impulses. The team injected these cells into the brains of rats that had been exposed to radiation. The animals did better at learning and memory tasks than irradiated rats that had not received cells, and about as well as untreated rats.

Analysis of rat brain tissue revealed that the transplanted cells re-insulated nerves in many parts of the brain.
Cell Stem Cell 16, **198–210** (2015)

ECOLOGY

Bee behaviour sees colonies collapse

Honeybee colonies could be collapsing because younger bees are flying out to forage, raising their risk of death.

Many bee colonies are failing, probably because of parasites, pathogens and pesticides. Bees react to such stressors by foraging at a younger age, so to learn how this might cause rapid population declines, Andrew Barron at Macquarie University in Sydney and his colleagues radio-tagged bees in experimental colonies to monitor their flight behaviour. The insects that began foraging earlier in life completed fewer successful trips and had a lower survival rate than those that foraged at the normal age.

Mathematical models showed that the resulting decrease in food for the colony and the increased forager mortality over time led to rapid colony collapse. The authors suggest that supplemental feeding of colonies could help to stave off bee declines.
Proc. Natl Acad. Sci. USA http://dx.doi.org/10.1073/pnas.1422089112 (2015)

CLIMATE CHANGE

Aerosols reduce Arctic warming

Particles suspended in the atmosphere have decreased the amount of warming caused by greenhouse gases in the Arctic, but this could change as future air pollution is reduced.

Aerosols have a cooling effect by reflecting sunlight back into space. Mohammad Reza Najafi at the University of Victoria in Canada and his colleagues analysed nine climate models running from