Cover

The porous deposit of candle soot can be used as a template for a super oil- and water-repellent coating. The soot is coated with a thin silica shell to form a replica and is then removed by calcination. The silica is treated with a fluorosilane, yielding a transparent, stable coating. This cheap and easily upscalable approach may inspire the design of anti-fingerprint coatings, which are desirable for touchscreens or glasses. See page 67.

Photo illustration: Bricelyn Strauch and Yana Hammond/Science; candle image: Fotosearch
RESEARCH ARTICLE

53  The Technology Path to Deep Greenhouse Gas Emissions Cuts by 2050: The Pivotal Role of Electricity
J. H. Williams et al.
Reducing greenhouse gas emissions to 80% below 1990 levels by 2050 requires widespread electrification of transportation and other sectors.

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59  Subparticle Ultrafast Spectrum Imaging in 4D Electron Microscopy
A. Yurtsever et al.
A specially constructed electron microscope can probe plasmon fields created by optically exciting metal nanoparticles.

64  Ohm’s Law Survives to the Atomic Scale
B. Weber et al.
Nanowires created by embedding phosphorus atoms within silicon exhibit a low, diameter-independent resistivity.

67  Candle Soot as a Template for a Transparent Robust Superamphiphobic Coating
X. Deng et al.
Coatings that are highly resistant to water and to hydrocarbons can be made starting from candle soot.

70  Capturing Ultrasmall EMT Zeolite from Template-Free Systems
E.-P. Ng et al.
Control of the early stages of nucleation favors the synthesis of large-pore zeolite crystals ~10 nanometers in size.

73  An Exhumation History of Continents over Billion-Year Time Scales
T. J. Blackburn et al.
Thermochronology indicates a balance between low erosion rates and slow thermal cooling in old continental crust.

76  Multiyear Prediction of Monthly Mean Atlantic Meridional Overturning Circulation at 26.5°N
D. Matei et al.
The strength of an ocean current that transports heat to Europe can be predicted up to 4 years in advance.

79  Ancestral Developmental Potential Facilitates Parallel Evolution in Ants
R. Rajakumar et al.
The potential for developing “supersoldiers” has remained dormant in the ant genus Pheidole for at least 30 million years.

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M. O. Casanueva et al.
Stochastic variation in a cellular stress response pathway can predict the outcome of mutations in individuals.

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F.-F. Soon et al.
Two players and one chair regulate this plant hormone signaling cascade.

89  Equilibrative Nucleoside Transporter 3 Deficiency Perturbs Lysosome Function and Macrophage Homeostasis
C.-L. Hsu et al.
Lack of the transporter critical for recycling of nucleosides after phagocytosis results in a fatal expansion of macrophages.

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K. Inamori et al.
A bifunctional enzyme adds a heteropolysaccharide to an extracellular matrix receptor, enabling it to bind laminin.

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M. Zofall et al.
RNA processing factors regulate the assembly of heterochromatin at individual gene loci in fission yeast.

100  Asymmetry and Aging of Mycobacterial Cells Lead to Variable Growth and Antibiotic Susceptibility
B. B. Aldridge et al.
The growing pole of the tuberculosis-causing bacterium is inherited by only one offspring, which can then elongate faster.

104  Langerhans Cells Facilitate Epithelial DNA Damage and Squamous Cell Carcinoma
B. G. Modi et al.
A specialized immune cell population in the skin promotes tumorigenesis by metabolizing environmental carcinogens.

108  Stop Signals Provide Cross Inhibition in Collective Decision-Making by Honeybee Swarms
T. D. Seeley et al.
Scout bees bring about nest-site decisions by targeting stop signals at bees with other candidate sites.
RESEARCH ARTICLE: Paracrine Signaling Through MYCN Enhances Tumor-Vascular Interactions in Neuroblastoma
Y. H. Chanthary et al.
P12K/Mtor Inhibitors Inhibit angiogenesis by blocking MYCN-dependent paracrine signaling between tumor and endothelial cells.

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B. Benderly
Paula Stephan’s new book looks beyond rosy press releases to uncover the harsh economic realities of the academic job market.
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G. Koch
A former Silicon Valley entrepreneur found his calling helping underprivileged therapies reach those who need them most.
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On the 6 January Science Podcast: the parallel evolution of “supersoldier” ants, Ohm’s law at the atomic scale, connecting obesity to cancer, and more.
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RESEARCH ARTICLE: Incoherent Feedforward Modulation of Signal Transduction Networks—Reconciling Ultrasensitivity with Bifunctionality?
R. Straube (Comment) and P. Jiang (Response)
Complex biochemical and regulatory properties of a bifunctional enzyme mean that its activity cannot be modeled as a simple bifunctional system with distinct and reciprocally regulated states.

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RESEARCH ARTICLE: Inhibition of PP1 Phosphatase Activity by HBx—A Mechanism for the Activation of Hepatitis B Virus Transcription
D. Cougot et al.
A virus prolongs the activity of a host transcription factor to promote expression of viral genes.

RESEARCH ARTICLE: Nonreciprocal Light Propagation in a Silicon Photonic Circuit
R. Straube (Comment) and P. Jiang (Response)
Interference of a single input beam in a silicon photonic circuit modeled as a simple bifunctional system with distinct and reciprocal effects.

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RESEARCH ARTICLE: Novel Adenovirus-Based Vaccines Induce Broad and Sustained T Cell Responses to HCV in Man
E. Barnes et al.
An adenoviral HCV vaccine induces antiviral T cell responses in human volunteers.

FOCUS: Chimp Virus Makes a Savvy Vaccine Vector
M. Houghton
A hepatitis C virus vaccine delivered by a chimpanzee-derived adenovirus vector produces strong cellular immune responses in healthy human volunteers.

PODCAST
S. Colloca and A. Colome
A conversation with Alfredo Nicosia about the discovery of new adenoviruses that will help to make better vaccines to treat human diseases.
Science 335 (6064), 10-113.

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