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## **IBM et National Geographic Kids se voient décernés par le Guinness World Records® le titre de la plus petite couverture de magazine au monde réalisée avec une imprimante 3D microscopique**

**Cette méthode permettra de fabriquer les prototypes d'une nouvelle génération de technologies, des transistors à haute efficacité énergétique aux nano-étiquettes de sécurité empêchant la falsification de documents**

**Paris, France - 28 avr. 2014:** Dans le cadre du festival [USA Science & Engineering](#) qui se déroule à Washington, D.C., *National Geographic Kids* annonce avoir remporté son neuvième titre mondial du GUINNESS WORLD RECORDS® pour la plus petite couverture de magazine au monde, grâce à une technologie IBM.

Flickr Photos: [https://www.flickr.com/photos/ibm\\_research\\_zurich/sets/72157644009299745](https://www.flickr.com/photos/ibm_research_zurich/sets/72157644009299745)

Pour réaliser cette couverture record, les chercheurs d'IBM ont inventé un minuscule 'burin' doté d'une pointe chauffante de silicium, 100 000 fois plus petite qu'une mine de crayon aiguisée. Il a fallu seulement 10 minutes aux scientifiques pour graver la couverture du magazine sur un polymère, une substance constitutive du plastique, avec cette nano-pointe qui permet de créer des motifs et des structures à une échelle microscopique. La couverture du magazine ainsi obtenue mesure 11 x 14 micromètres, tellement petite que 2 000 images de cette taille pourraient tenir sur un grain de sel.

### **Comment les chercheurs d'IBM ont réalisé cette couverture**

La pointe d'une longueur de 500 nanomètres est attachée à un levier flexible qui scanne de manière contrôlée la surface du substrat, ici un polymère, avec la précision du nanomètre, ce qui correspond à un millionième de

millimètre. La pointe peut tailler le matériau du substrat à partir de motifs prédéfinis en y appliquant localement pression et chaleur, opérant ainsi comme une « nano-fraiseuse » ou une imprimante 3D à très haute précision.

A la manière d'une imprimante 3D, d'avantage de matière peut être enlevée pour créer des structures 3D complexes avec une précision du nanomètre en modulant la force appliquée ou en retravaillant des endroits spécifiques.

Cette nouvelle technique permettra en principe de réaliser les prototypes de nouveaux dispositifs, comme les transistors à effet tunnel, pour une électronique plus rapide et performante, utilisable dans diverses applications telles que les centres de calcul pour le 'Cloud' ou les téléphones mobile. D'ici la fin de l'année, IBM espère commencer à utiliser cette technologie pour réaliser des transistors à base de matériaux tels que le graphène.

### **A propos de la recherche IBM**

Pour plus d'informations, consulter [www.research.ibm.com](http://www.research.ibm.com)

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## **IBM and National Geographic Kids Unveil GUINNESS WORLD RECORDS® Title for the World's Smallest Magazine Cover Made with a Microscopic 3D Printer**

*Can be used to prototype a new generation of technologies, from energy-efficient transistors to nano-sized security tags to prevent document forgery*

**WASHINGTON - 28 Apr 2014:** *National Geographic Kids* today claimed its ninth GUINNESS WORLD RECORDS® title for the Smallest Magazine Cover, using patented technology from IBM (NYSE: [IBM](#)), at the USA Science & Engineering Festival in Washington, D.C.

To create the record-setting cover, IBM scientists invented a tiny "chisel" with a heatable silicon tip 100,000 times smaller than a sharpened pencil point. Using this nano-sized tip, which creates patterns and structures on a microscopic scale, it took scientists just 10 minutes and 40 seconds to etch the magazine cover onto a polymer, the same substance of which plastics are made. The resulting magazine cover measures 11 × 14 micrometers, which is so small that 2,000 could fit on a grain of salt.

To select which cover to shrink, *National Geographic Kids* turned to its readers to vote online for their favorite design. The March 2014 cover that earned the most votes as well as a microscopic version, visible through a ZEISS Axio Imager 2 microscope, was unveiled at the USA Science & Engineering Festival. It will be on display at the *National Geographic Kids* and IBM booth #3728 on April 26 and 27.

*"National Geographic Kids magazine subscribers loved this cover, so it makes sense that a broader audience would vote it as their favorite of 2014 as well. And by helping to set this Guinness World Records title, they're learning about science while having fun, which is what Kids is all about,"* said **Rachel Buchholz, vice president and editor of National Geographic Kids.**

*National Geographic Kids'* eight previous GUINNESS WORLD RECORDS titles are: Longest Line of Footprints (10,932 prints measuring two miles, set in 2004); Largest Collection of Plush Toys (2,304 stuffed animals, set in 2006); Longest Chain of Shoes (10,512 shoes, set in 2008); Most Items of Clothing Collected for Recycling (33,088 items of denim clothing, set in 2009); Most People Doing Jumping Jacks in 24 Hours (300,265, set in 2011), Largest Collection of Shoes to Recycle (16,407, set in 2013); Most People Running 100 Meters in 24 hours (30,914, set in 2013); and Largest Online Photo Album (104,022 pictures, set in 2013).

### **How IBM researchers created the cover**

The nanometer-sized tip, which can be heated to 1000 degrees Celsius (1,832 degrees Fahrenheit), is attached to a bendable cantilever that controllably scans the surface of the substrate material, in this case a polymer invented by chemists at IBM Research in Almaden, California, with the accuracy of one nanometer—one millionth of a millimeter. By applying heat and force, the tip can remove substrate material based on predefined patterns, thus operating like a "nanomilling" machine or a 3D printer with ultrahigh precision.

Similar to using a 3D printer, more material can be removed to create complex 3D structures with nanometer precision by modulating the force or by readdressing individual spots.

This new capability may impact the prototyping of new transistor devices, including tunneling field effect transistors, for more energy-efficient and faster electronics for anything from cloud data centers to smartphones. By the end of the year IBM hopes to begin exploring the use of this technology to prototype transistor designs made of graphene like materials.

*"To create more energy-efficient clouds and crunch Big Data faster, we need a new generation of technologies including novel transistors. But before we can put these future technologies into mass production, we need new techniques for prototyping below 30 nanometers,"* said **[Dr. Armin Knoll, a physicist and inventor at IBM Research.](#)** *"With our novel technique we can achieve very high resolution at 10 nanometers at greatly reduced cost and complexity. In particular by controlling the amount of material evaporated, we can also produce 3D relief patterns at the unprecedented accuracy of merely one nanometer in a vertical direction. Now it's up to the imagination of scientists and engineers to apply this technique to real-world challenges."*

Scientists envision many different applications including nano-sized security tags to prevent the forgery of documents like passports and priceless works of art and in the emerging field of quantum computing. One way to connect quantum systems is via electromagnetic radiation or light. The nano-sized tip could be used to create high-quality patterns to control and manipulate light at unprecedented precision.

IBM has licensed this technology to a startup based in Switzerland called SwissLitho, which is bringing the technology to market under the name NanoFrazor. Several weeks ago, the firm shipped its first NanoFrazor to McGill University's Nanotools Microfab in Canada, where scientists and students will use the tool's unique fabrication capabilities to experiment with ideas for designing novel nano-devices. To celebrate the tool's arrival the university created a [nano-sized map of Canada](#) measuring 30 micrometers or 0.030 millimeters wide.

IBM received a record [6,809 U.S. patents](#) in 2013, marking the 21st consecutive year in a row that the company topped the annual roundup of patent recipients. More than 8,000 IBM inventors residing in 47 different U.S. states and 41 countries patented a range of nanotechnology and semiconductor inventions in 2013 such as the following patents that enabled the record-setting microscopic 3D printer innovation: [U.S. Patent #8,592,955](#): Accurate deposition of nano-objects on a surface and [U.S. Patent #8,574,815](#): Patterning nano-scale patterns on a film comprising unzipping copolymers.

## **IBM and Nanotechnology Leadership**

For more than 100 years IBM has invested in scientific research to shape the future of computing. Today's announcement is a demonstration of the results achieved by IBM's world-leading scientists thanks to the company's continual investment in and focus on exploratory research.

Scientists have been striving to "see" and manipulate atoms and molecules to extend human knowledge and push the frontiers of manufacturing capabilities to the nanometer regime. IBM has been a pioneer in nanoscience ever since the development of the [scanning tunneling microscope](#) in 1981 by IBM Fellows Gerd Binnig and Heinrich Rohrer at IBM Research. For this invention, which made it possible to image individual atoms and later on to manipulate them, Binnig and Rohrer were awarded the Nobel Prize in Physics in 1986. The AFM, an offspring of the STM, was invented by Binnig in 1986. The STM is widely regarded as the instrument that opened the door to the nanoworld.

More recently, the Binnig and Rohrer Nanotechnology Center was opened in 2011 on the campus of IBM Research - Zurich to continue the company's investment in world-class collaborative nanoscale research. Almost one year ago, scientists from IBM unveiled the world's smallest movie, made with one of the tiniest elements in the universe: atoms. Named "[A Boy and His Atom](#)," the GUINNESS WORLD RECORDS® -verified movie used thousands of precisely placed atoms to create nearly 250 frames of stop-motion action.

## **Additional resources**

Click [www.bit.ly/ibmnanotimeline](http://www.bit.ly/ibmnanotimeline) for a timeline of IBM nanotechnology leadership.

Learn more about this story at <http://bit.ly/PtIKTe>

To join the social conversation on Twitter use the hashtag #smallestcover

## **About *National Geographic Kids***

*National Geographic Kids* inspires young adventurers to explore the world through award-winning magazines, books, apps, games, toys, videos, events and a website, and is the only kids brand with a world-class scientific organization at its core. *National Geographic Kids* magazine (10 issues per year) and *Little Kids* magazine (six issues per year) are photo-driven publications available on newsstands or by subscription in print and on tablets. The award-winning website [kids.nationalgeographic.com](http://kids.nationalgeographic.com) excites kids about the planet through games, videos, contests, photos, quizzes and blogs about cultures, animals and destinations. National Geographic Kids Books is the leading nonfiction publisher with 60 titles each year, including the New York Times bestseller “Kids Almanac.” *National Geographic Kids* safely engages kids to learn through digital play in the virtual animal world of Animal Jam. *National Geographic Kids* apps bring the best of *National Geographic Kids* to smartphones and tablets.

## **About IBM Research**

For more information visit [www.research.ibm.com](http://www.research.ibm.com)

## **About GUINNESS WORLD RECORDS**

GUINNESS WORLD RECORDS ([www.guinnessworldrecords.com](http://www.guinnessworldrecords.com)) is the global authority on record-breaking achievements. First published in 1955, the annual Guinness World Records® book has become one of the biggest-selling copyright titles of all time, selling 120 million copies to date in 22 languages and in more than 100 countries. The internationally renowned brand is now also available across a number of platforms — GWR’s global television shows are watched by 250 million viewers annually; digital media and online record-processing services attract more than 50 million visitors a year; and the live events team annually entertains and inspires 1.5 million people around the world. GWR receives more than 1,000 applications each week and has a specialized team of multi-language record managers and adjudicators who travel the globe to verify official record attempts. GWR also has a commercial division (Guinness World Records Corporate) that offers accessible record-breaking business solutions to other organizations and brands.

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