Recyclable Thermoset Plastics

A new kind of plastic to cut landfill waste

Plastics are divided into thermoplastics and thermoset plastics. The former can be heated and shaped many times and are ubiquitous in the modern world, comprising everything from children's toys to lavatory seats. Because they can be melted down and reshaped, thermoplastics are generally recyclable. Thermoset plastics, however, can only be heated and shaped once, after which molecular changes mean they are "cured," retaining their shape and strength even when subjected to intense heat and pressure.

Due to this durability thermoset plastics are a vital part of our modern world. They are used in everything from mobile phones and circuit boards to the aerospace industry. But the same characteristics that have made them essential in modern manufacturing also make them impossible to recycle. As a result, most thermoset polymers end up as landfill. Given the ultimate objective of sustainability, there has long been a pressing need for recyclability in thermoset plastics.

In 2014 critical advances were made in this area with the publication of a landmark paper in Science announcing the discovery of new classes of thermosetting polymers that are recyclable.

Called poly(hexahydrotriazine)s, or PHTs, these can be dissolved in strong acid, breaking apart the polymer chains into component monomers that can then be reassembled into new products. Like traditional unrecyclable thermosets, these new structures are rigid, resistant to heat and tough, with the same potential applications as their unrecyclable forerunners.

Although no recycling is 100 percent efficient, this innovation—if widely deployed—should speed up the move toward a circular economy, with a big reduction in landfill waste from plastics. We expect recyclable thermoset polymers to replace unrecyclable thermosets within five years, and to be ubiquitous in newly manufactured goods by 2025.

Processing Plant of Recycled Plastic

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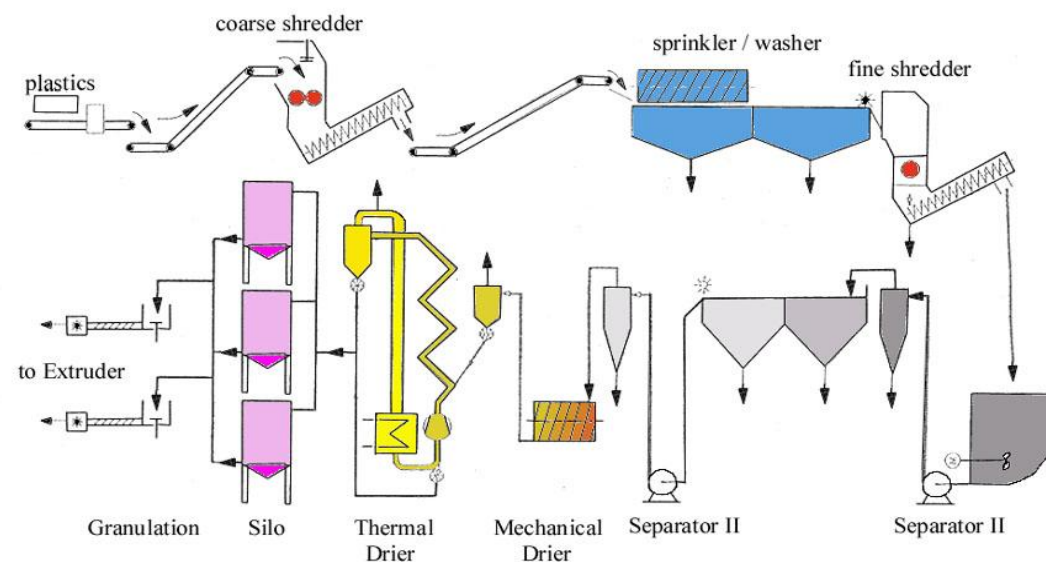
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P1 / MOBILE COLLABORATION
The app synchronized his contributions with everyone else's

P2 / NANOSTRUCTURED CARBON COMPOSITES
New techniques to nanostructure carbon fibres for novel composites

P3 / SCREENLESS DISPLAY
Holographic colour video display with the resolution of a standard TV.

P4 / THE REAL 4G
Such breakthroughs could give networks some 30 times as much capacity as LTE-Advanced.

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Ultra Private Smartphones With Security And Privacy Of Snowden Era

On January 21 a text message flashed on phones held by the protesters thronging Kiev's Independence Square. Ukraine's president, Viktor Yanukovych, was then still clinging to power and brutalizing opponents. The message—from the number 111—read: *"Dear subscriber, you are registered as a participant in a mass disturbance."* Widely presumed to have been sent from Yanukovych's security apparatus to all phones in the protest zone, the message was a stark reminder of how mobile phones can be used for surveillance.

Soon after, a Ukrainian man walked into a nondescript office in National Harbor, Maryland, and sought help from a man named Phil Zimmermann.

Zimmermann is a cryptologist. His company, Silent Circle, encrypts voice calls, text messages, and any file attachments. If you use Silent Circle, your calls to other users are sent through the company's servers and decrypted on the other phone. The service won't stop the delivery of ominous messages in range of certain base stations. But it can block eavesdropping and prevent the snooper from knowing the number of the person you are calling or texting. Soon, access codes for Silent Circle were making their way to protest organizers in the heart of Kiev.

Documents brought to light by former U.S. National Security Agency contractor Edward Snowden suggest that the NSA gathers huge amounts of information from cloud computing platforms and wireless carriers. Modern smartphones and the apps running on them are engineered to collect and disseminate enormous amounts of user data—such as location, Web browsing histories, search terms, and contact lists. By summer Zimmermann will be delivering a new way to fight back: a highly secure smartphone, called Blackphone which uses Zimmermann's encryption tools and adds other protections. It runs a special version of the Android operating system—PrivatOS—that blocks many of the ways phones leak data about your activities. While custom security phones have long been in the hands of military and government leaders, this effort may signal a shift toward mass-market phones that are far more private and secure.

Zimmermann always wanted to take widespread encryption to the next level: secure telephony. Until the past few years, however, voice transmissions did not generally take the digital form required by cryptographic technologies. In the 1990s he'd built a prototype, but it required using modems tethered to PCs. "That product was never going to get any traction," he says. Today, telephone companies and carriers do encrypt calls—but they hold the crypto keys in their servers, and "phone companies have historically been very coöperative with wiretapping," he says. Zimmermann's protocols instead kept the keys only at endpoints—preventing the carriers and even his own servers from decrypting the content of a call.

These days, almost all telephony is digital—not just obvious forms like Skype, but cellular and landlines, too. So when a former U.S. Navy SEAL, Mike Janke, approached Zimmermann in 2011 with an idea for providing a service to help U.S. military members make secure calls home, he was game. They joined with Jon Callas, creator of Apple's whole-disk encryption, to found Silent Circle. Blackphone is an amalgamation of technologies. Silent Circle provides the encrypted voice and text services; the device is being made by Geeksphone, a Spanish company that specializes in phones that run open-source operating systems. Together they created -PrivatOS, which gives more control over what data apps can see, encrypts data stored on the phone, and allows you to get wireless security updates directly from Blackphone, rather than relying on carriers. While the phone is resistant to everyday threats like hacking and snooping by data brokers, even the company concedes that it's not NSA-proof.
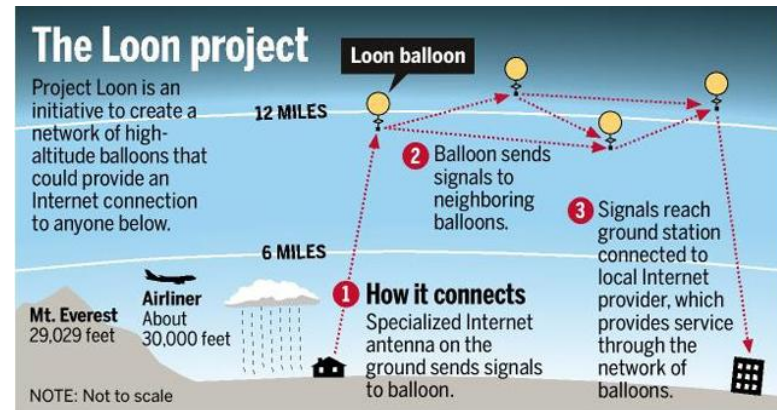
Project Loon

Billions of people could get online for the first time thanks to helium balloons that Google will soon send over many places cell towers don't reach.

Google has launched hundreds of these balloons into the sky, lofted by helium, which is 15 meters across, that resemble giant white pumpkins. At this moment, a couple of dozen float over the Southern Hemisphere at an altitude of around 20 kilometers, in the rarely visited stratosphere—nearly twice the height of commercial airplanes. Each balloon supports a boxy gondola stuffed with solar-powered electronics. They make a radio link to a telecommunications network on the ground and beam down high-speed cellular Internet coverage to smartphones and other devices. It's known as Project Loon, a name chosen for its association with both flight and insanity.

Google says these balloons can deliver widespread economic and social benefits by bringing Internet access to the 60 percent of the world's people who don't have it. Many of those 4.3 billion people live in rural places where telecommunications companies haven't found it worthwhile to build cell towers or other infrastructure.

The Loon project

Project Loon is an initiative to create a network of high-altitude balloons that could provide an Internet connection to anyone below.

12 MILES

2 Balloon sends signals to neighboring balloons.

3 Signals reach ground station connected to local Internet provider, which provides service through the network of balloons.

6 MILES

1 **How it connects** Specialized Internet antenna on the ground sends signals to balloon.

Mt. Everest 29,029 feet | Airliner About 30,000 feet

NOTE: Not to scale

> " Project Loon aims to change the economics of Internet access. "

It is odd for a large public company to build out infrastructure aimed at helping the world's poorest people. But in addition to Google's professed desires to help the world, the economics of ad--supported Web businesses give the company other reasons to think big. It's hard to find new customers in Internet markets such as the United States. Getting billions more people online would provide a valuable new supply of eyeballs and personal data for ad targeting.

"HARMLESS SCIENCE EXPERIMENT." That's what was written on the boxes carried by the balloons that the secretive Google X lab began to launch over California's Central Valley in 2012, along with a phone number and the promise of a reward for safe return. Inside the boxes was a modified office Wi-Fi router. The balloons were made by two seamsters hired from the fashion industry, from supplies bought at hardware stores. Those working on Project Loon are confident the public good will be served.

Precise Genetic-Engineering Techniques

A breakthrough offers better crops with less controversy

Conventional genetic engineering has long caused controversy. Now new techniques are emerging that allow us to directly "edit" the genetic code of plants to make them, for example, more nutritious or better able to cope with a changing climate; we believe the benefits, and the precision in "editing," could allay the concerns, leading to more widespread adoption.

Currently, the genetic engineering of crops relies on the bacterium agrobacterium tumefaciens to transfer desired DNA into the target genome. The technique is proved and reliable and, despite widespread public fears, there is a consensus in the scientific community

that genetically modifying organisms using this technique is no riskier than modifying them using conventional breeding. Whereas agrobacterium is useful, more precise and varied genome-editing techniques have been developed in recent years.

These include ZFNs, TALENs and, more recently, the CRISPR–Cas9 system, which evolved in bacteria as a defence mechanism against viruses. CRISPR–Cas9 uses an RNA molecule to target DNA, cutting to a known, user-selected sequence in the target genome. This capability can disable an unwanted gene or modify it in a way that is functionally indistinguishable from a natural mutation. Using "homologous recombination," CRISPR can also be used to insert new DNA sequences or even whole genes into the genome in a precise way.
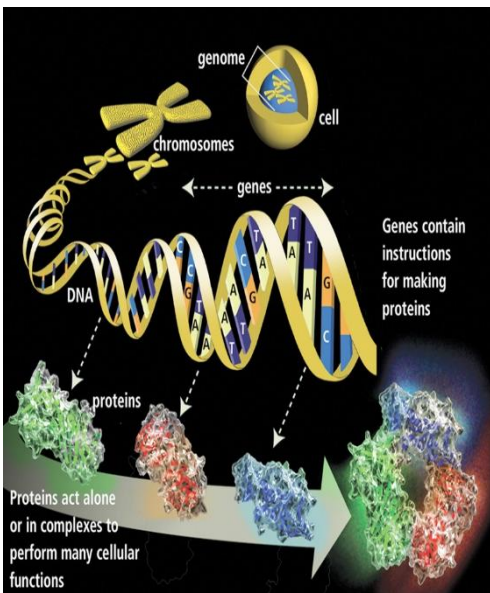
Internet of DNA

A global network of millions of genomes could be medicine's next great advance.

Availability: 1-2 years

Breakthrough	Why It Matters	Key Players
Technical standards that let DNA databases communicate.	Your medical treatment could benefit from the experiences of millions of others.	+ Global Alliance for Genomics and Health + Google + Personal Genome Project

DNA IS the next internet

Have you logged into your Galaxy today?

In January, programmers in Toronto began testing a system for trading genetic information with other hospitals. These facilities, in locations including Miami, Baltimore, and Cambridge, U.K., also treat children with so-called -Mendelian disorders, which are caused by a rare mutation in a single gene. The system, called MatchMaker Exchange, represents something new: a way to automate the comparison of DNA from sick people around the world. But pressure is building to use technology to study many, many genomes at once and begin to compare that genetic information with medical records. That is because scientists think they'll need to sort through a million genomes or more to solve cases.

Up to date, more than 200,000 people have already had their genomes sequenced and this continues to rise. However, the challenge in genomics is that a great deal of the above life-saving information, though already collected, is still inaccessible.

This could ultimately lead to discoveries about the genetics of common and rare diseases. To complicate this matter more, we also have to consider all of the social and legal concerns when it comes to privacy rules. DNA data is protected because it can identify individuals, like a fingerprint—and medical records are private too.

Knowing that trafficking DNA across the Web could be a target for "Hacking your genetic code", would you be willing to share your genomic data in the hope of saving?

LUMUS LENS, A NEW AGE WEARLESS LENS TECHNOLOGY

Lumus is the name for the new age lens technology. Its path breaking new technology in the visual technology area. it has a 720p near HD quality augmented reality display. This display is embedded into a this glass which would be almost impossible to sight from a distance or even from proximity. Its possible to watch movies and videos like on any other screen.
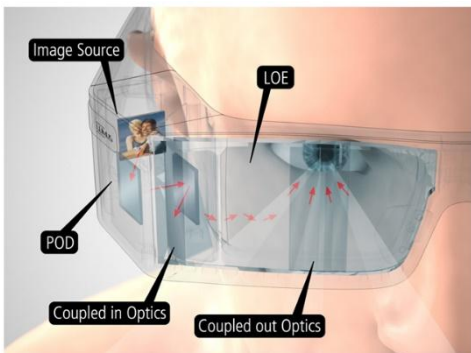
Lumus comes with inclusion of Android OS and Camera. This makes it even more useful and is better than Google Glass or any other tech in this sector. It reswponds to hand gestures with which one can control the device and its display. This lens tech is very useful when user is busy or away.

It has Stereoscopic image enabling 3D video and gaming. Allows discreet viewing and hands free flow of critical data, keeping u connected no matter what you're doing. Watching on the go while seeing what's going on around you – Situational Awareness. No fatigue or dizziness because of open peripheral vision and proprietary alignment methods and procedures. As lens is this, the wearable is light and comfortable to use in gadgets.