

Thorben Rath
ProSieben Galileo
Science Hero Deplastinator
Time: 8 Minutes
Date: February 2, 2019

This script was translated from German to English via Google Translate, with additional editing provided by Jordan Guggisberg and John Beumer. For inquiries, contact csp@umn.edu.

Plastic spills into our planet. An insoluble problem?

No! Because maybe not everything is lost yet: A university laboratory in America is currently working on a method with which plastic is released into air almost on command. Sound incredible? Yes ... but it's a reality: the lab is headed by a true science hero! "

This is Dr. Marc Hillmyer ... he has declared war on plastic pollution. His secret weapon: this little piece of plastic ...

At the sight of it, it literally melts away: because Marc ... is ... The Deplastinator [graphic special effect of Marc changing to The Deplastinator super hero] His vision: Plastic that is environmentally friendly ... and dissolves after use!

The base of the hero: the University of Minnesota, in the very north of the USA. Here Marc has been teaching chemistry for 21 years. But his real passion is research: he works on sculpting the future.

Marc wants to create a plastic that does not pollute the environment, but is still as versatile as conventional plastics.

In addition, it should be completely recyclable. Sounds too good to be true?
See how our science hero develops the sculpture of the future.

This is the, well, not very secret ... secret laboratory! It's a "normal" university lab that revolutionizes our plastic world in a subtle way.

And Marc does not work on it alone - like other superheroes, he has assistants: Derek. Clarie. And Guilhem.

The team did not team up for the money or the glory - but for a mission: A fight for a better future. The Deplastinator and his team fight for us! The opponent: the evil plastic stroller! He and his trash have a firm grip on our planet.

Five giant waste streams poison our oceans. Every year, eight million tons of new plastic waste ends up in the oceans. The majority of packaging. Because plastic crumbles extremely slowly ... A plastic bottle for example "lives" after being thrown away for up to 450 years.

Sure, there are already alternatives - plastic from algae ... or plastic from mushrooms ... but these antiquities are still very expensive - and often consume themselves a lot of energy in the production

But The Deplastinator apparently has the answer: the plastic of his team is made from biomass and recyclable. How do you do that?

The starting material is lignin, a main ingredient that is really organic.

And this liquid should now just become organic plastic. The first step: a water bath!
After about an hour something has changed!

The three ingredients have mixed ... and have become thick. After stirring the mixture again, this time with a mechanical rod. Then the most important additive comes in: Isocyanates, a group of chemical compounds.

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And they take care of that:
The mixture foams!
And the liquid gets stuck quickly.
This is ... plastic

So this is real organic plastic! With the same properties as foam from fossil fuels. One finds in everyday life, for example, in packaging, or even in upholstery.

But the plastic from Marc can do even more! If it is no longer needed, it will revert to its original material! A true world first.

Turning the plastic back into the original liquid - how does that work? With a mixture of cold and hot. On one side ... is a container in ice-cold liquid nitrogen.

Then the plastic is heated.

And indeed: in the cold container, the lignin regroups, with which everything has begun!
What exactly happened here?

The three main ingredients hold the plastic firmly together.
But if it is heated now, these compounds dissolve.
The substances fall back into their original form.

The lignin evaporates and rises. It is cooled down in the cannula. So the lignin becomes liquid again; that is the chemical recycling process.
A process as if you could turn cheese back into milk ...

The material can be reused almost indefinitely. This is still a very expensive process. But as soon as this bioplastic goes into mass production, it could look very different

The industry has already become aware. From foam to hard plastic ... at some point they want to be able to replace all plastic types biologically - and then let them decay again.

The sculpture of the future, for which the Deplastinator honestly deserved his heroic cloak - and maybe even a Nobel Prize at some point ...