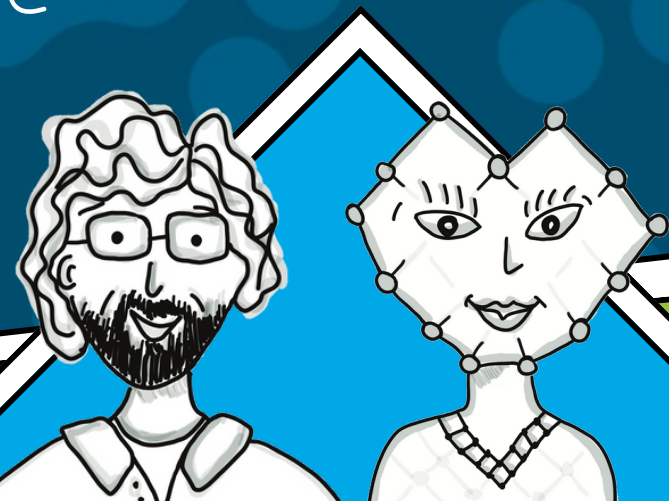
MOST-H_2

Nano the MOF & Professor Theodore save the planet!



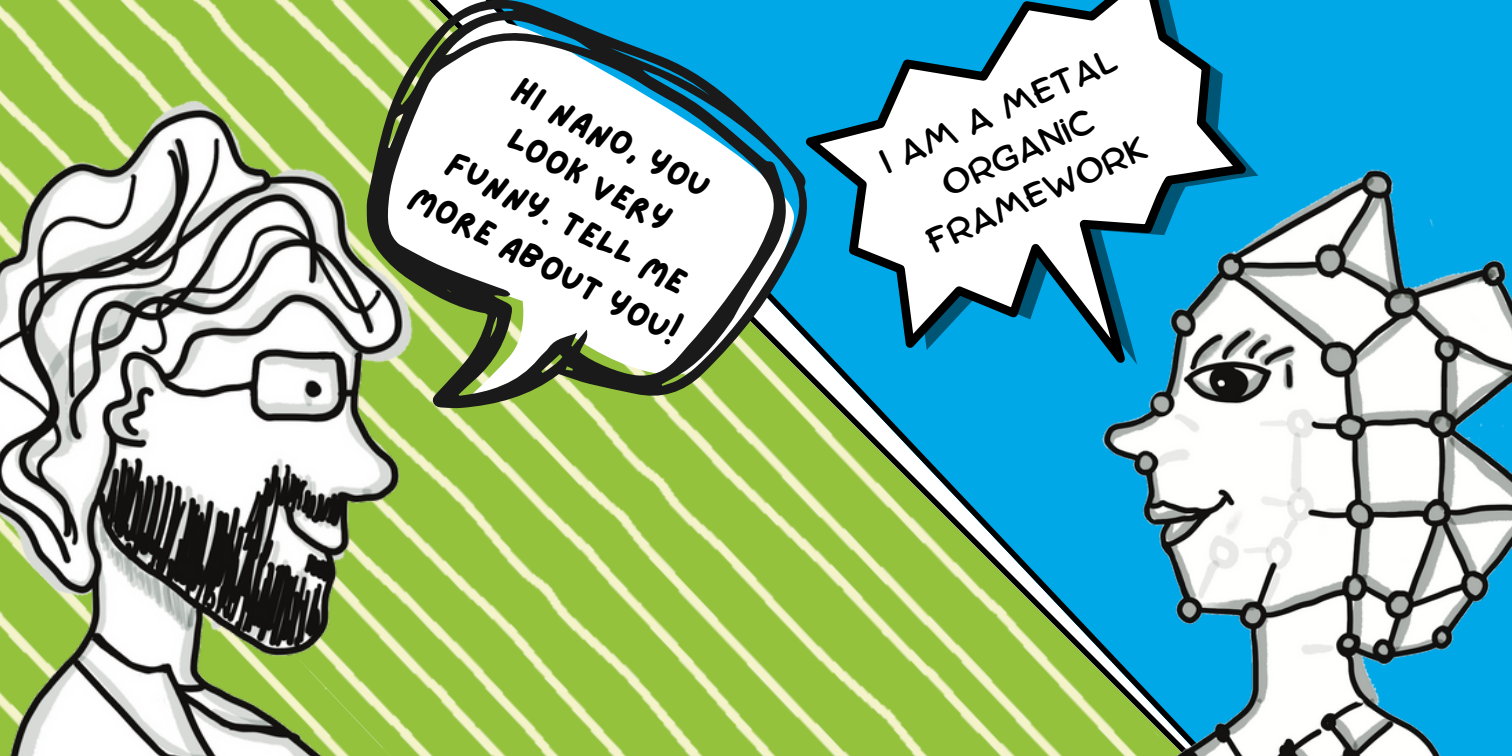

PROFESSOR THEODORE
NANO THE MOF

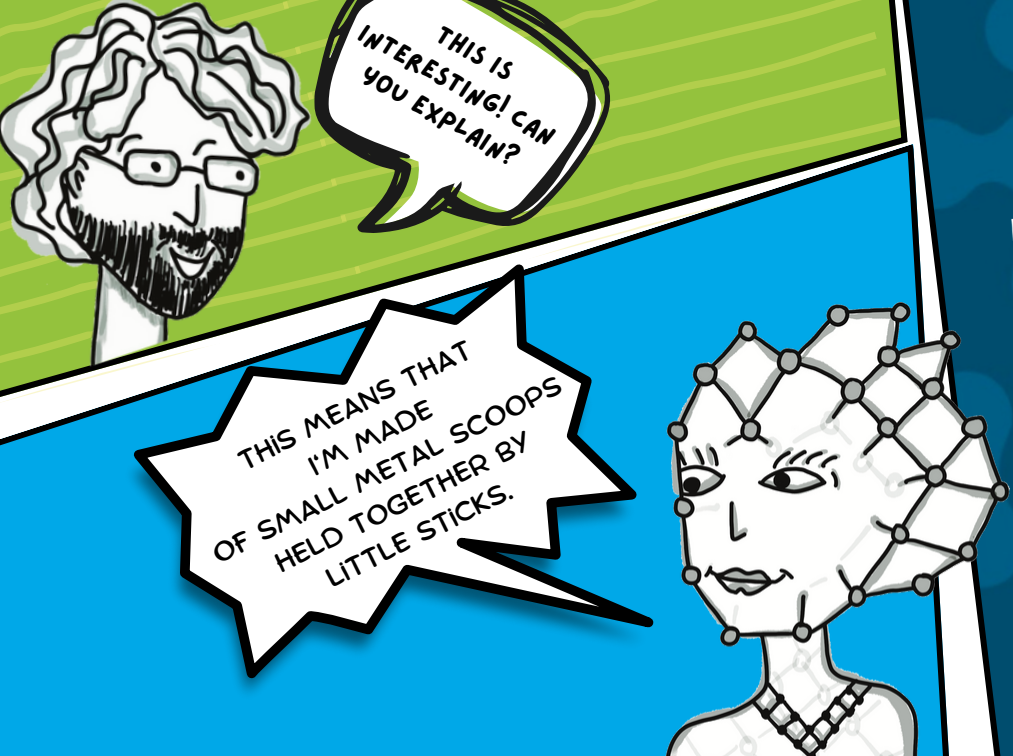

Hi, I AM NANO
THE MOF
I AM VERY SMALL
AND I HAVE A
SUPER-POWER!


WITH PROFESSOR THEODORE, I CAN SAVE THE PLANET!
DO YOU WANT TO DISCOVER HOW?

EPISODE 1

The super-power of Nano the MOF


HI NANO, YOU LOOK VERY FUNNY. TELL ME MORE ABOUT YOU!
I AM A METAL ORGANIC FRAMEWORK



LEARN MORE

Metal Organic Frameworks (we will call them MOFs) are solid materials, made of metallic ions (which are acting as connectors) and of organic material (which are acting as linkers between the connectors).

Organic material is made of the same molecules than living organisms (plant, animals). This means mainly carbon, oxygen and hydrogen.

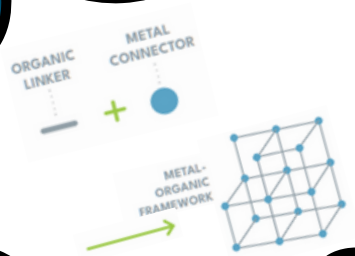
LEARN MORE

In MOFs, the geometrical structure between the metallic ions and the organic linkers creates high porosity.
This means there are empty spaces, named pores, within the MOFs. You can imagine something porous as full of tiny holes.

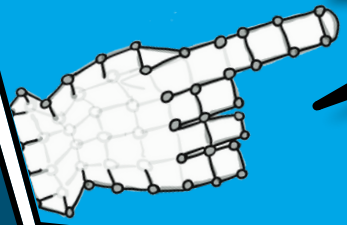
WHY ARE YOU SO SPECIAL?

I AM SUPER POROUS!

LEARN MORE

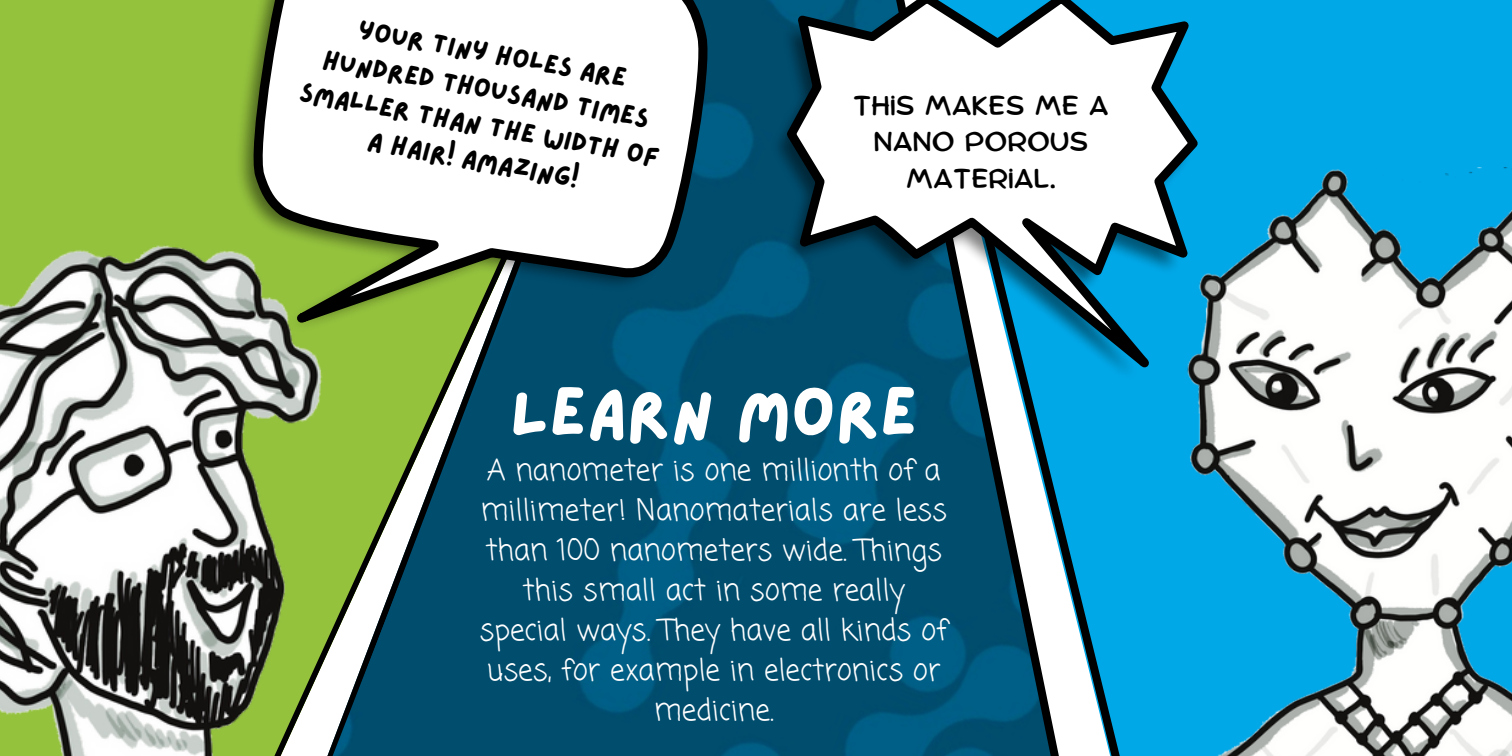


POROUS?



MY SKELETON IS MADE OF SCOOPS AND STICKS, IS FULL OF TINY EMPTY HOLES!

THIS MAKES ME VERY LIGHT



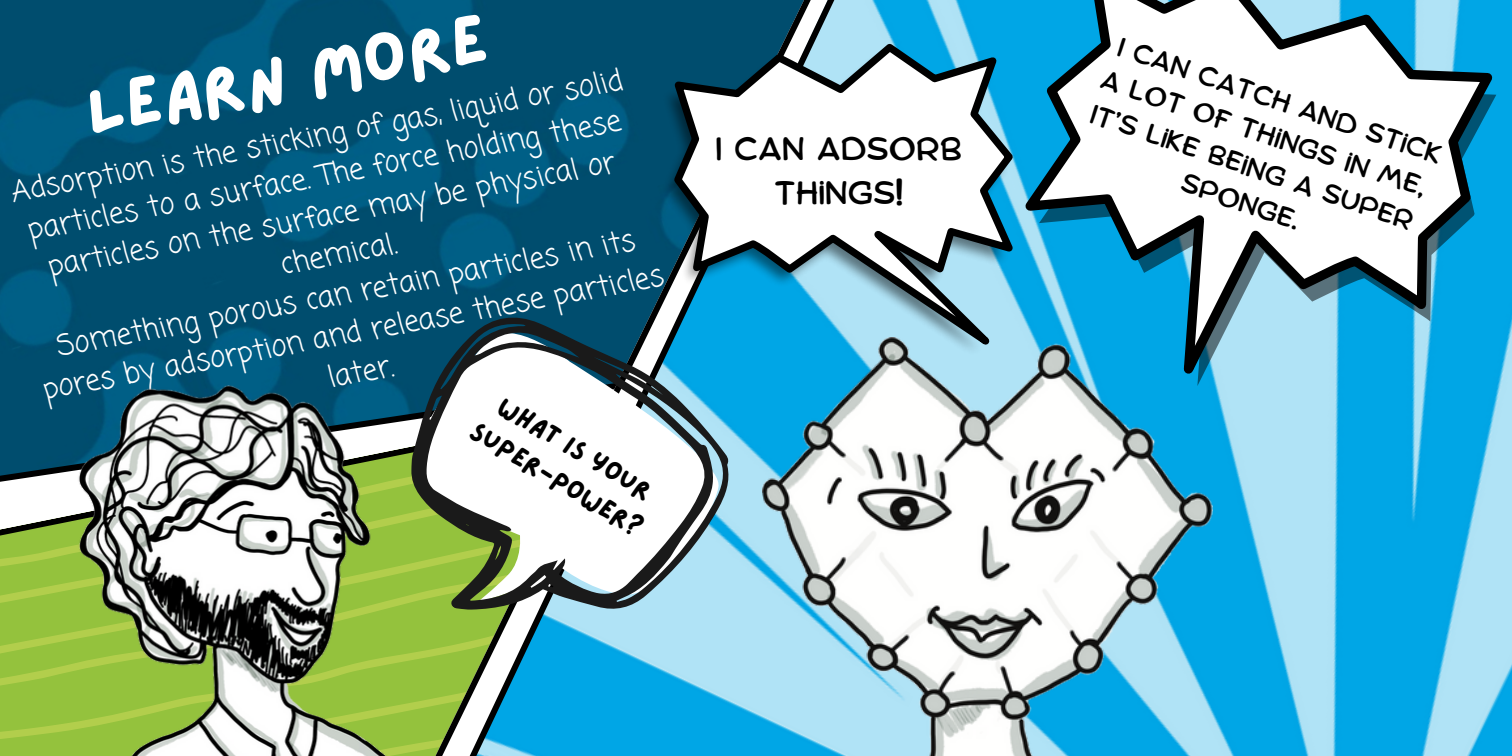
LEARN MORE

A nanometer is one millionth of a millimeter! Nanomaterials are less than 100 nanometers wide. Things this small act in some really special ways. They have all kinds of uses, for example in electronics or medicine.

LEARN MORE

Adsorption is the sticking of gas, liquid or solid particles to a surface. The force holding these particles on the surface may be physical or chemical.

Something porous can retain particles in its pores by adsorption and release these particles later.



LEARN MORE

Hydrogen is the simplest and the most abundant chemical element in the universe.
It can be used to produce electricity and to power vehicles. And this, without CO_2 emissions.
Because hydrogen is very light, it is very difficult to store. MOFs can store hydrogen in their pores by adsorption.

WHAT CAN YOU DO WITH YOUR ADSORPTION POWER?

I CAN REMOVE POLLUTANTS FROM THE AIR OR FROM WATER!

I CAN ALSO STORE A LOT OF ENERGY BY ADSORBING GREEN HYDROGEN.

I CAN CARRY MEDICINES TO THE EXACT SPOT INSIDE OUR BODIES WHERE THEY ARE NEEDED.

EPISODE 2

The super-power of Professor Theodore

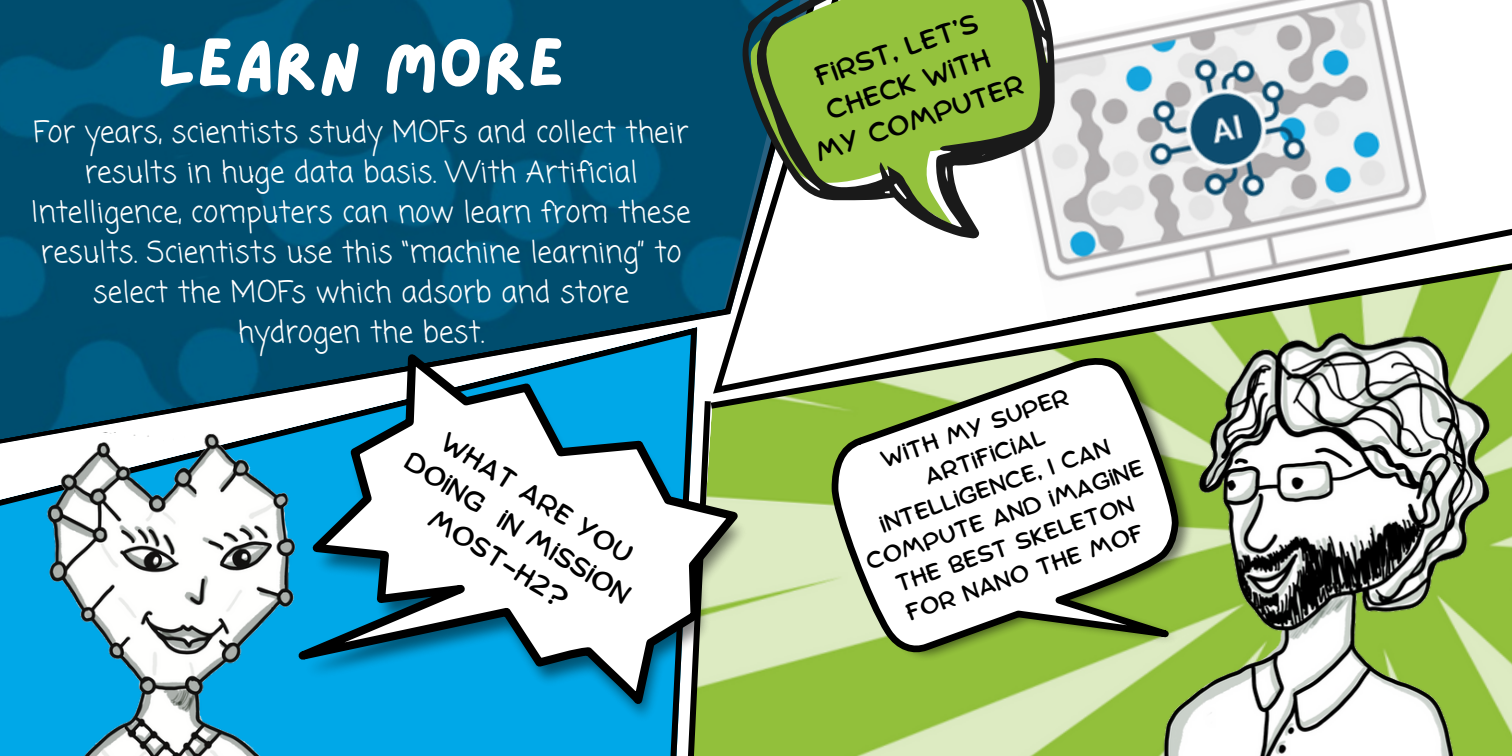

HI, I AM PROFESSOR THEODORE
I AM SUPER SMART AND I LOVE SCIENCE!

LEARN MORE

MOST-H2 is the name of a research project. Scientists of 8 European countries are working together to find new MOFs. They improve them to store more hydrogen.
They are also looking for new ways of producing MOFs, so that we can use them to store energy in the future.

LEARN MORE

For years, scientists study MOFs and collect their results in huge data basis. With Artificial Intelligence, computers can now learn from these results. Scientists use this "machine learning" to select the MOFs which adsorb and store hydrogen the best.



LEARN MORE

It is difficult to find the best composition for MOFs. The structure can be made of different metals and many different organic linkers, which gives to the MOFs very different properties. It is also very difficult to produce MOFs and to make them as porous as possible. In the laboratory, chemists make different chemicals react together to produce the desired MOFs. This is named synthesis.

WITH MY FRIENDS, WE HAVE A FANTASTIC IDEA!

WE CONCENTRATE THE POWER OF NANO THE MOF IN CUBES!

AND WE CAN MEASURE THIS POWER WITH THE NEW TOOLS WE ARE BUILDING.

LEARN MORE

The higher the surface in the pores of a MOF, the more hydrogen it can adsorb. This can be done by compacting the MOFs in a monolith. This is a very stable and solid form, like a cube. In this monolith form the MOFs can adsorb much more hydrogen than when he was produced in a powder form.

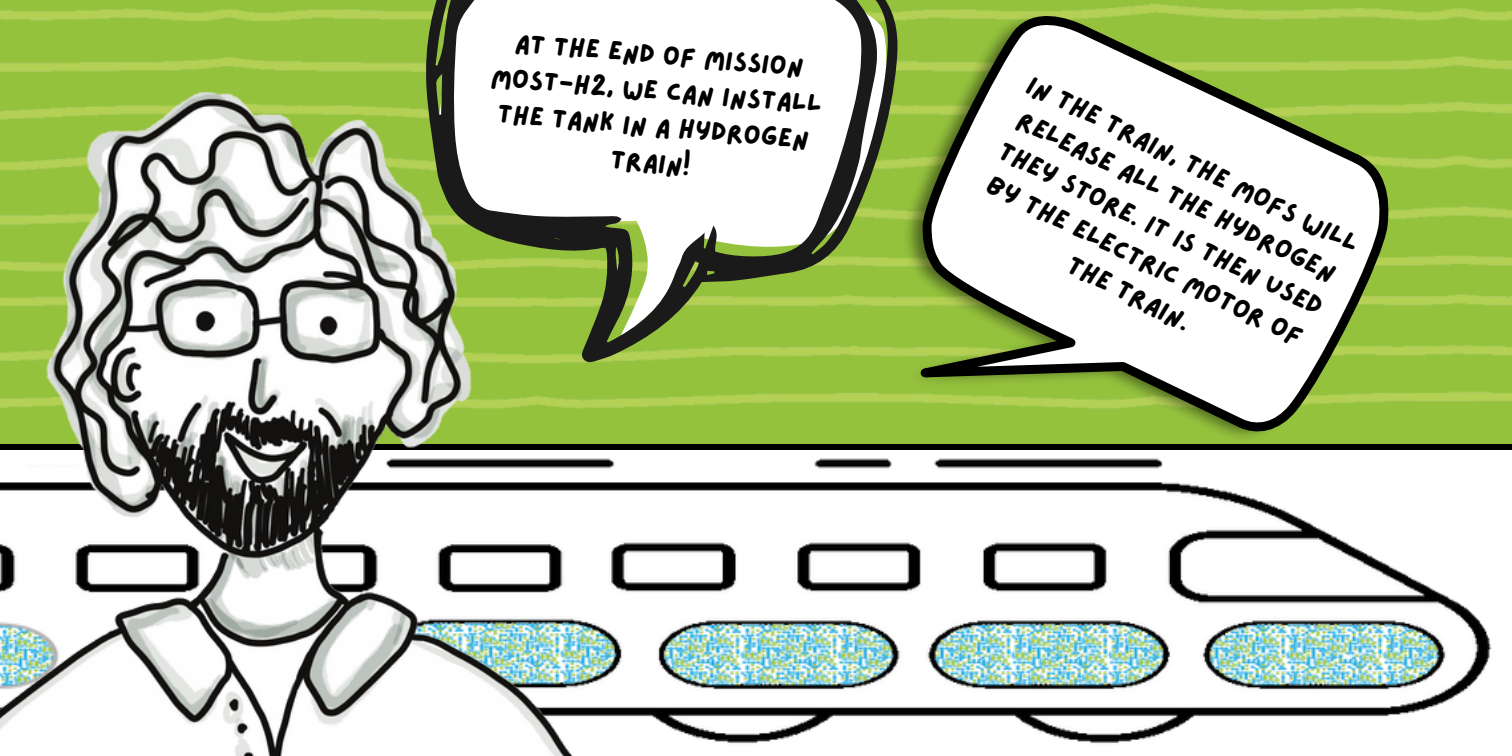
EPISODE 3

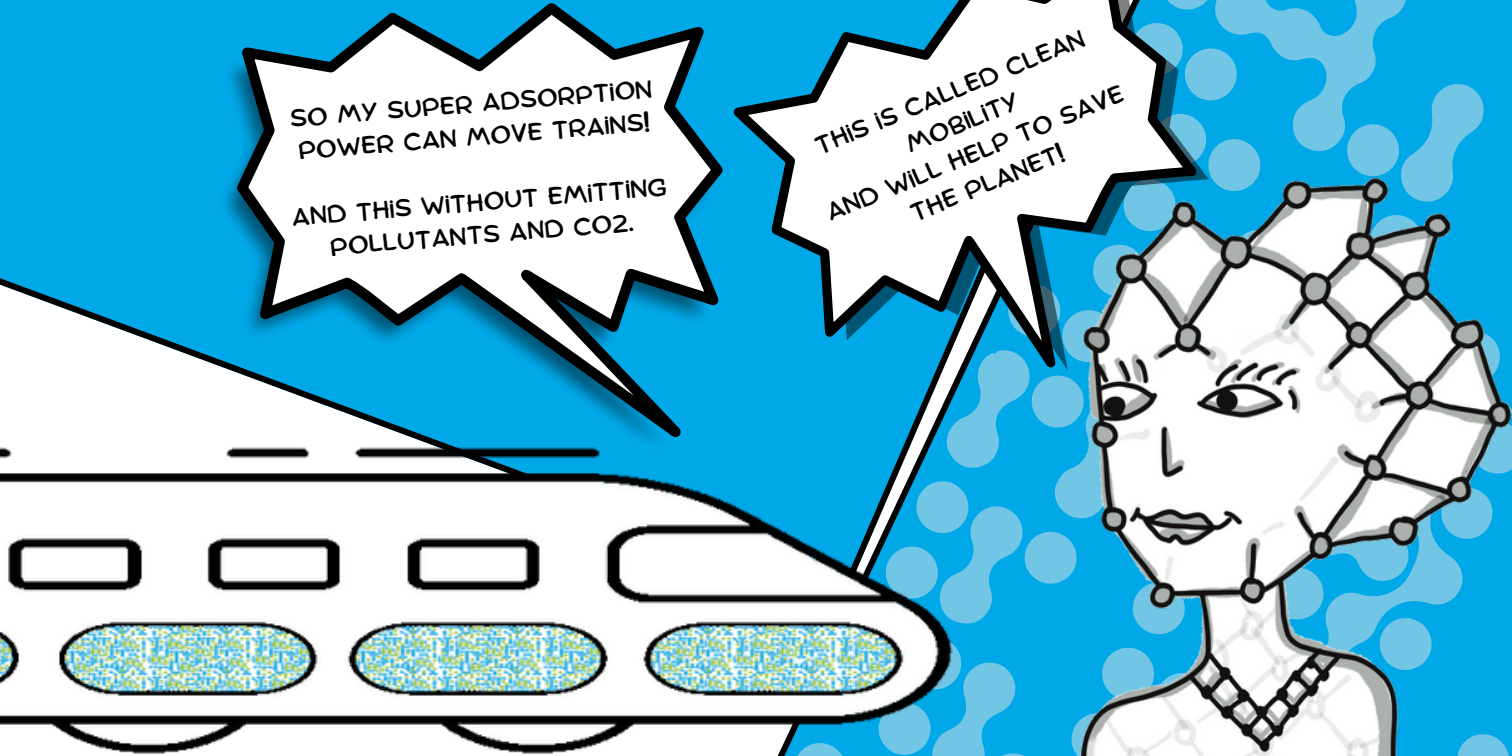
How Nano the MOF and Professor Theodore save the planet!


NANO THE MOF, THE PLANET IS THREATENED BY CLIMATE CHANGE!
WE NEED CLEAN VEHICLES, PURE AIR AND NO CO2 EMISSIONS ANYMORE.
WITH MY NEW SUPER-POWER I CAN HELP!
LET'S START WITH USING HYDROGEN IN TRAINS.

DURING MISSION MOST-H2, WE FIRST NEED TO FIND AN EASY AND FAST WAY TO PRODUCE A LOT OF MOFS LIKE YOU!

AND THEN WE BUILD A TANK TO PUT THEM IN.
IN THIS WAY, THEY CAN SAFELY STORE AND TRANSPORT A LOT OF GREEN HYDROGEN.


AT THE END OF MISSION MOST-H2, WE CAN INSTALL THE TANK IN A HYDROGEN TRAIN!
IN THE TRAIN, THE MOFS WILL RELEASE ALL THE HYDROGEN THEY STORE. IT IS THEN USED BY THE ELECTRIC MOTOR OF THE TRAIN.


SO MY SUPER ADSORPTION POWER CAN MOVE TRAINS!
AND THIS WITHOUT EMITTING POLLUTANTS AND CO2.
THIS IS CALLED CLEAN MOBILITY AND WILL HELP TO SAVE THE PLANET!


THE END

THANK YOU

Nano the MOF and Professor Theodore got
a lot of money from the European Union
for helping to save the planet.
They say: "Thank you!"

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SOURCES

For writing the "Learn more" sections , the authors used vocabulary.com, kids.kiddle.co, academickids.com and similar sources

https://most-h2.eu/

Funded by the European Union