THE NOBEL PRIZE

Chemistry Prize 2019

Developing the world's most powerful battery

Nobel Prize Lessons

The Nobel Prize in Chemistry

"to the person who made the most important chemical discovery or improvement"

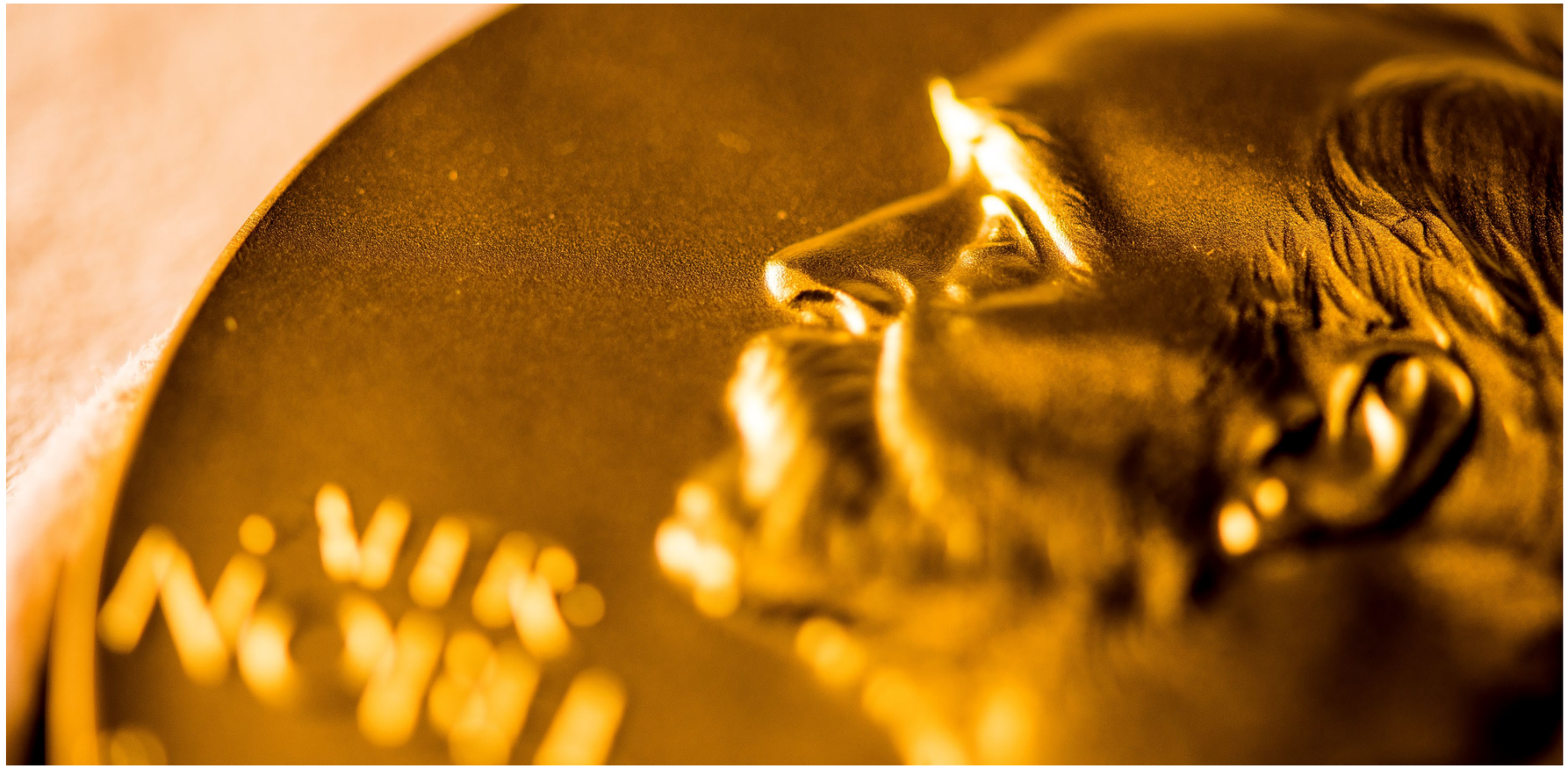


PHOTO: ALEXANDER MAHMOUD

Who is rewarded with the Chemistry Prize?

People who have made discoveries or improvements that have given us knowledge about the structure of various substances and how they are created and changed.

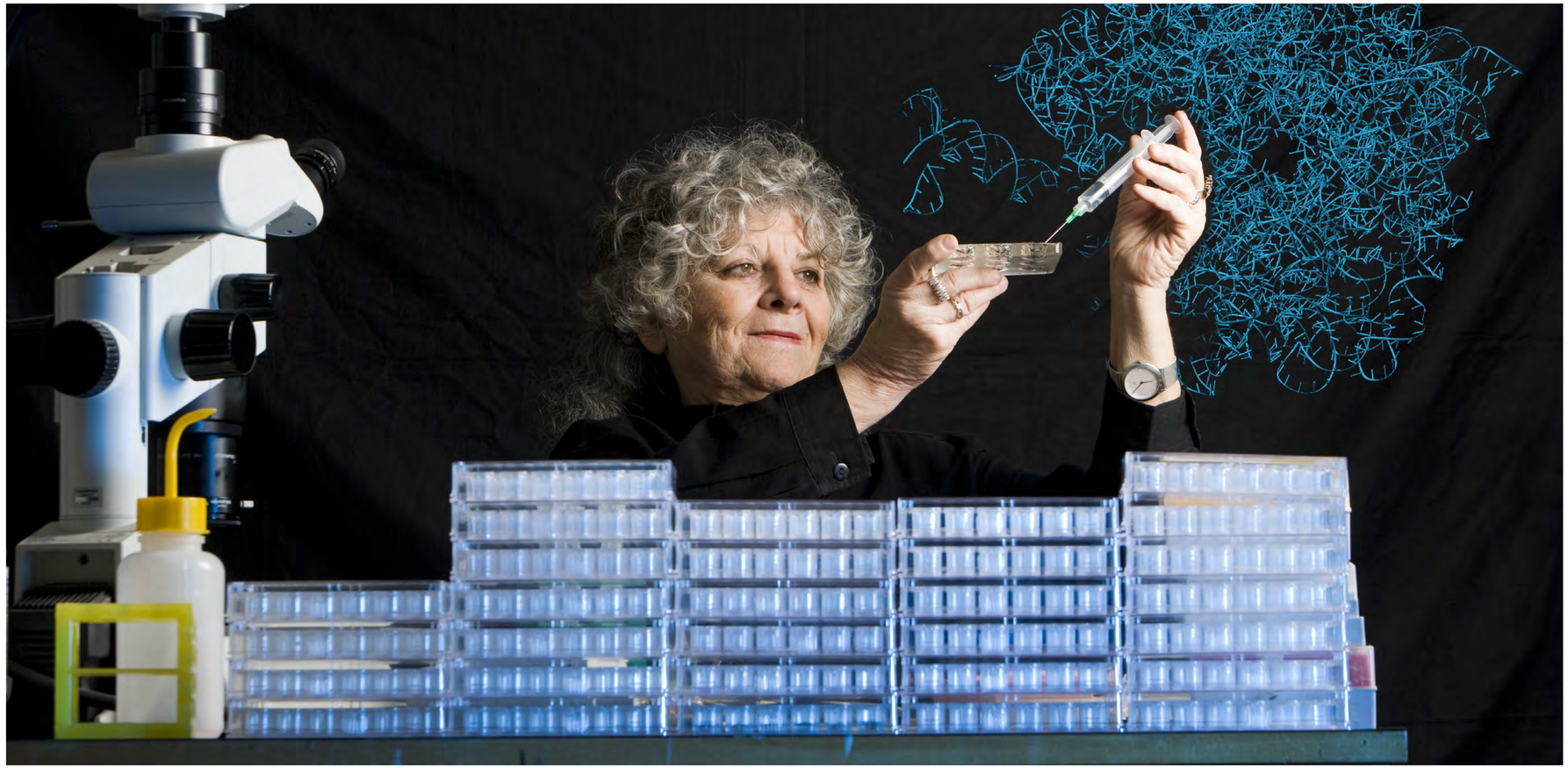
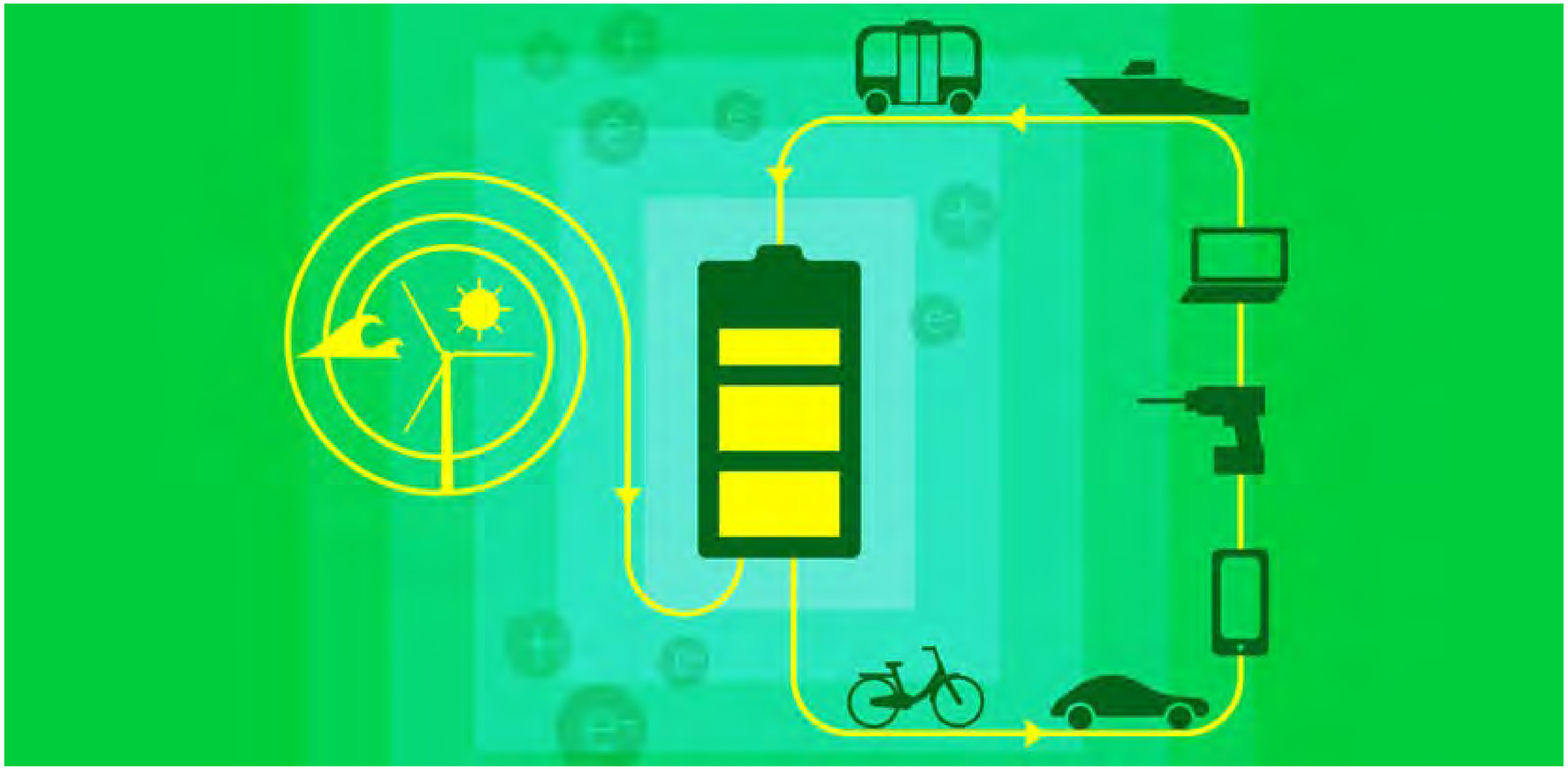


PHOTO: MICHELINE PELLETIER/CORBIS

The 2019 Chemistry Prize

The prize rewards the development of the world's most powerful battery. The lithium-ion battery enabled the creation of laptop computers, mobile phones and electric cars and storage of renewable energy.



The Nobel Laureates

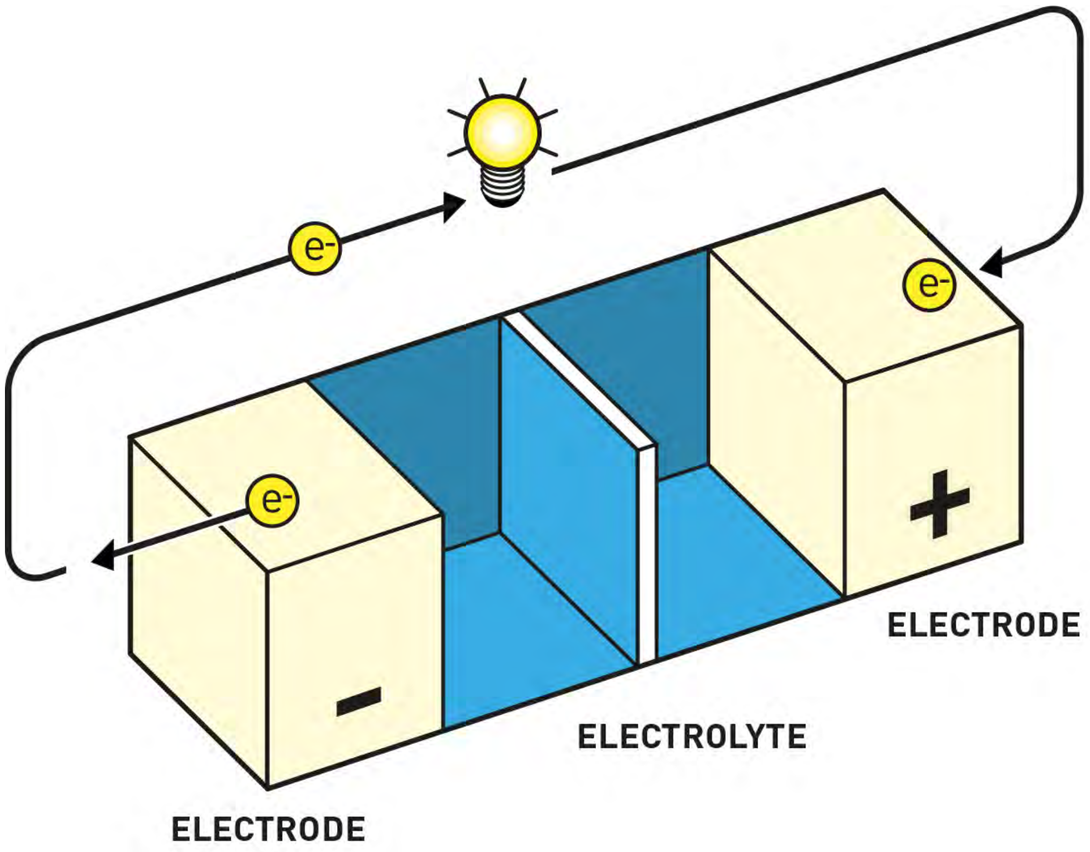
"for the development of lithium-ion batteries"

John B. Goodenough
Born: 1922, Germany

M. Stanley Whittingham
Born: 1941, United Kingdom

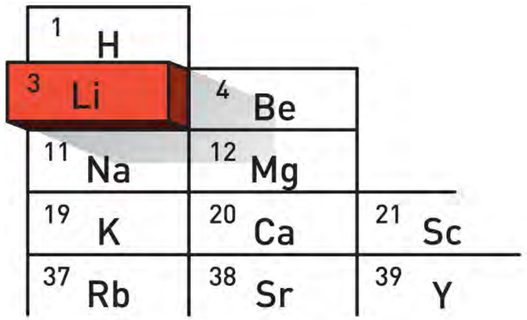
Akira Yoshino
Born: 1948, Japan

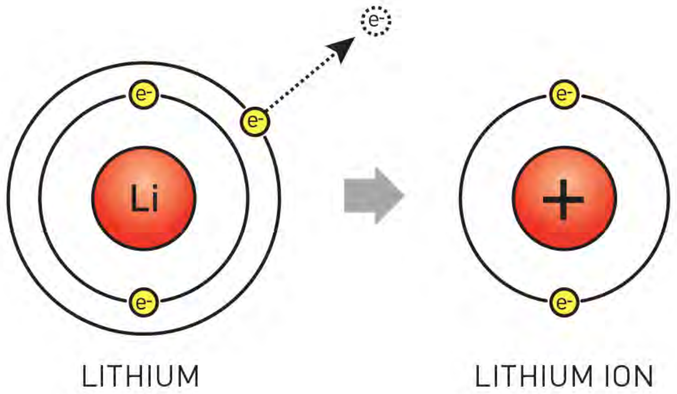
How does a battery work?



The four components of a battery: negative electrode, positive electrode, electrolyte and external circuit.

The starring role of lithium, a chemical element

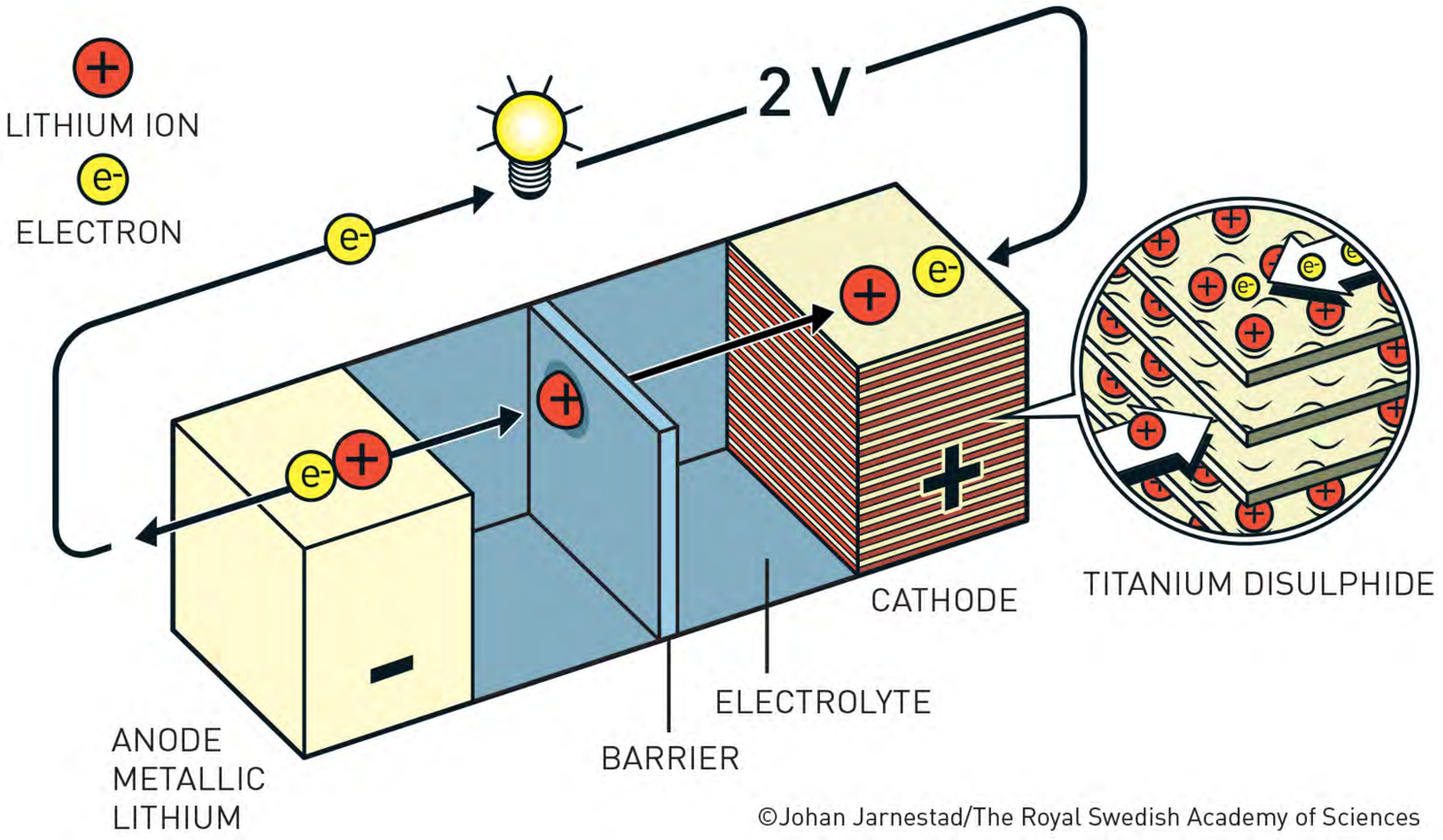




Lithium's position in the periodic table of elements is due to its characteristics: light and reactive.

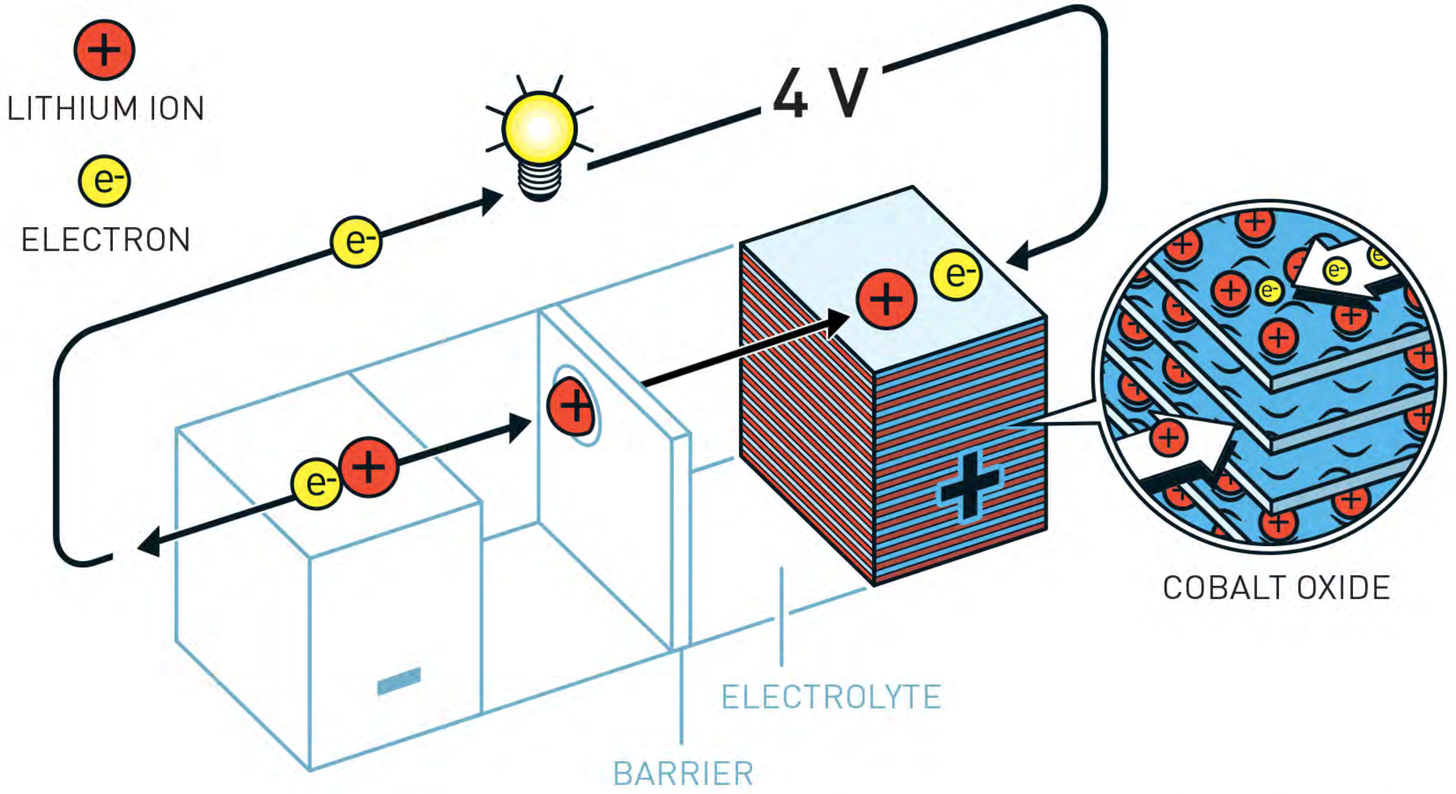
The rechargeable lithium battery

Whittingham's battery, in which metallic lithium is the negative electrode (anode) and titanium disulphide is the positive electrode (cathode).



More powerful batteries

In his battery, Goodenough switched to a positive electrode made of cobalt oxide, which produces a much higher voltage.



Safer batteries

In Yoshino's battery, he switched to a negative electrode made of carbon-based petroleum coke together with lithium ions, thus creating a safer battery.

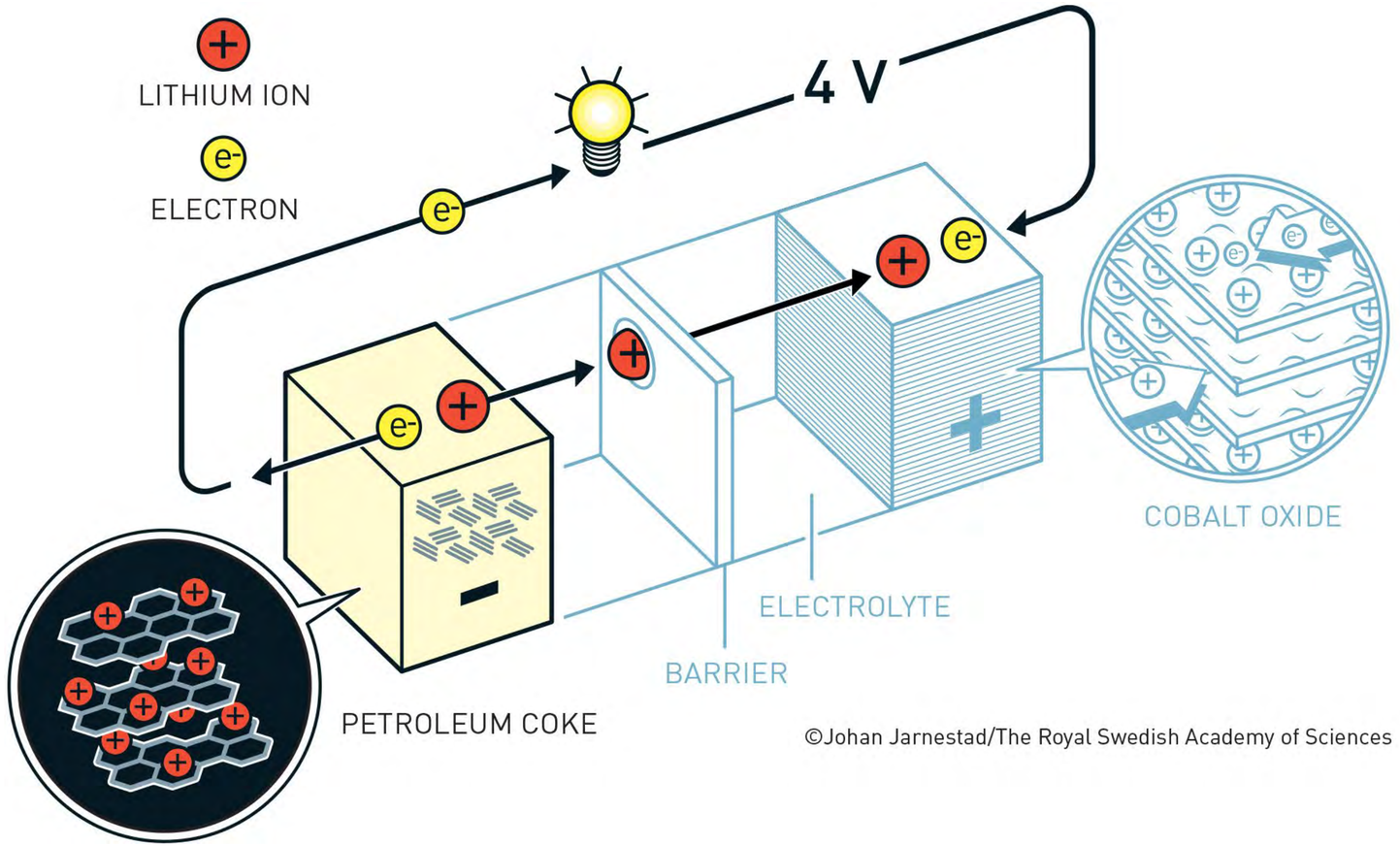


IMAGE: NASA /WMAP SCIENCE TEAM

The benefits

Lithium-ion batteries enabled the creation of modern portable electronic devices. But perhaps most importantly, they contribute to more sustainable energy use.

“We can see an enormous, dramatic effect on society because of this fantastic battery.”

Olof Ramström, a member of the Nobel Committee for Chemistry at the Royal Swedish Academy of Sciences

THE
NOBEL
PRIZE

FOR THE GREATEST BENEFIT TO HUMANKIND

Nobel Prize Lessons