

# New elements or rechargeable batteries for Nobel Chemistry Prize?

October 5 2016, by Pia Ohlin

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People walk past a statue of Swedish inventor Alfred Nobel at the Karolinska Institute in Stockholm

The Nobel Chemistry Prize is to be announced on Wednesday, with observers suggesting it could go to gene-editing, the invention of the rechargeable battery or the discovery of new periodic elements.

Sweden's biggest daily Dagens Nyheter tipped scientists at Russian, Japanese and US institutes that added four new elements to the periodic

table: nihonium (Nh), moscovium (Mc), tennessine (Ts) and oganesson (Og).

John Goodenough—a 94-year-old US scientist who invented the rechargeable lithium ion battery that is present in cell phones, computers and electric cars—was another of the favourites for the honour, mentioned by Dagens Nyheter and Swedish radio SR.

Also seen as Nobel-worthy was a technique known as CRISPR that can edit parts of the genome of still-developing embryos by cutting out, replacing or adding parts to the DNA sequence.

It was named by influential US journal *Science* as 2015's breakthrough of the year due to its potential to revolutionise health and medicine.

But it could be too early for the jury to award it a Nobel this year, Dagens Nyheter noted, as a bitter patent dispute is currently being waged over who discovered it first.

Sweden's other main daily Svenska Dagbladet nonetheless also mentioned CRISPR as a possible winner.



US President Barack Obama awards John Goodenough, inventor of the rechargeable lithium ion battery, with the National Medal of Science at the White House in 2013

It also pointed to Hong Kong doctor Yuk-Ming Dennis Lo, the director of the Li Ka Shing Institute of Health Sciences.

Lo discovered a technique to detect chromosome abnormalities in unborn foetuses, such as Down's Syndrome, where previous methods could cause a miscarriage.

The speculation will come to an end on Wednesday when the winner or winners are announced at 11:45 am (0945 GMT).

## **Chemistry, then peace**


The chemistry prize is the third Nobel to be announced this week.

On Tuesday, the physics prize went to British scientists David Thouless, Duncan Haldane and Michael Kosterlitz for their work in on "topology", a highly-specialised mathematics field studying unusual phases or states of matter which may one day yield superfast and small computers.

On Monday, the medicine prize went to Yoshinori Ohsumi of Japan for his pioneering work on autophagy—a process whereby cells "eat themselves", which can result in Parkinson's and diabetes when disrupted.

## Physics prize won by 3 British scientists

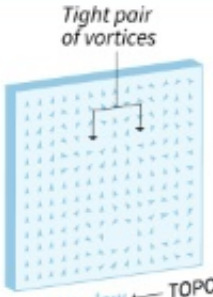
A branch of maths called **topology** was used to explain why some materials have unexpected electrical properties, especially when they are very thin and at very low temperatures



① Matter changes state with temperature changes

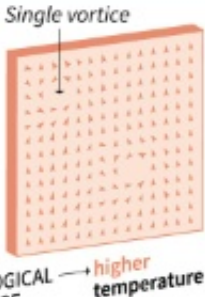
Standard phase change: ice → water → steam

David Thouless and Michael Kosterlitz discovered that **very thin, very cold materials also change phases** in terms of their **electrical properties**



Tight pair of vortices

Very low temperature  
• vortices in tight pair




Single vortex

higher temperature  
• vortices move off separately

TOPOLOGICAL PHASE TRANSITION

② Matter changes state in steps

If the magnetic field of a very thin layer changes, conductivity **changes**, not gradually **but in integer steps**



Two holes


One hole

Thouless and Duncan Haldane used topology to explain this phenomenon

### Applications

- Superconductors
- Quantum computers
- Superfluids
- Magnetic thin films
- Electrically conductive nanothreads

Source: nobelprize.org



Nobel Prize for Physics

On Friday, all eyes will turn to Oslo where perhaps the most prestigious

of the prizes, that for peace, will be announced.

The Norwegian jury has sifted through an avalanche of nominations this year—a record 376, almost a hundred more than the previous record from 2014.

Among those tipped are the orchestrators of two historic accords: the recent peace deal in Colombia between the government and the leftist FARC rebels, and the Iranian nuclear deal.

In a shock upset however, Colombians rejected the peace deal by a razor-thin majority in a referendum on Sunday, sending the former enemies' chances of securing a Nobel up in smoke, according to experts.

Also mentioned are Russian activist Svetlana Gannushkina, who has championed the rights of migrants and refugees, Syria's civil organisation of emergency responders known as the White Helmets, and Greek islanders who have come to the aid of desperate migrants.

US fugitive whistleblower Edward Snowden, who revealed the extent of the NSA's surveillance programmes, has meanwhile been nominated for the third straight year.

The economics prize will be announced on Monday, October 10, and the literature prize wraps things up on October 13.

For that prize, the Swedish Academy could tap superstar novelists such as Philip Roth of the US or Haruki Murakami of Japan, or some lesser known writers such as Norwegian playwright Jon Fosse or Syrian poet Adonis.

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