

Selenium Graphene-based catalyst in Fuel Cell

April 19, 2020

Why in news?

A selenium-graphene catalyst has been developed by a team of scientists from India.

What is this?

- Platinum and other such metals which are expensive are used as catalysts in today's fuel cells.
- However, their efficiency in many purposes is not reliable.
- Graphene modified with very low amounts of selenium atoms can work like platinum in a seen reaction by scientists.
- The "soft" catalyst for the oxygen decrease reaction in fuel cells is the graphene itself.
- The oxygen reduction reaction is a key step in the functioning of the fuel cell where Graphene by itself is a "poor" catalyst of this reaction.
- It involves the reduction of oxygen in two steps, each of which consumes two electrons.
- Neither selenium nor graphene are useful by themselves, but the combination of both works efficiently.
- The fuel cells with methanol have a poisoning effect (process where the methanol reaches the negative electrode and coats it thus making the electrode ineffective after some cycles).
- It has been found that the developed catalyst is highly poisoning-tolerant.

What does selenium mean?

- Selenium is a non-metallic chemical element in the

periodic table belonging to Group XVI.

- This behaves like arsenic and tellurium in chemical behaviour and physical properties.
- Selenium has excellent photovoltaic and photoconductive characteristics and is commonly used in electronics, including photocell, light meters, and solar panels.

What is a Fuel Cell?

- Fuel cells are electrical systems that translate chemical energy directly from reactants into electricity and heat.
- The device consists of a pore anode and a cathode on one side of the electrolyte layer.
- Gaseous fuels are continuously fed into the anode in a typical fuel cell (negative electrode), while oxidants (air oxygen) are fed into the cathode continuously (positive electrode). In order to produce an electric current, electrochemical reactions take place on the electrodes.