

Super capacitor built from discarded lithium ion batteries

What in news:

- Used old batteries can now help create super capacitors, which can in turn create better long-lasting batteries.

About news:

- Scientists from CSIR–Central Electrochemical Research Institute (CSIR-CECRI) in Karaikudi, Tamilnadu, and CSIR–Central Salt and Marine Chemicals Research Institute (CSIR-CSMCRI) in Bhavnagar, Gujarat,
- They collected discarded lithium-ion batteries and created reduced graphene oxide from them.
- This new material showed high specific capacity at low current making it an ideal material for next generation high-performance supercapacitor
- The specific capacity was found to be 112 farad per gram from fundamental evaluation, which is almost equal to the commercially available ones.
- Also the ones available in market today are created using activated carbon which is expensive and environmentally hazardous while our method is cheaper and fully environmental friendly” explains by Sivasankara Rao Ede, Ph.D scholar from CSIR-CECRI and one of the first authors of the paper published in Colloids and Surfaces A: Physicochemical and Engineering Aspects.
- The new electrodes made using the reduced graphene oxide showed high stability even after 20,000 cycles.
- They also had high retention capacity where 70% of the efficiency was retained even after 85 cycles.
- The efficiency slowly increased and reached 108% after 20,000 cycles. The long-term stability and robustness of the capacitor are the key parameters for qualifying as suitable candidates for commercial application.
- Today lithium-ion batteries are used widely and disposed after they run out, leading to mounting e-waste.
- They tried a new method and succeeded in recycling and reusing these batteries.
- The graphite anode and aluminium and stainless steel from dismantled batteries were used.
- The graphite was converted into graphene oxide by oxidation and subsequent exfoliation.

USES:

- Supercapacitors are now being used explicitly in wind turbine pitch control, rail (on-board or wayside), automotive (including hybrid vehicles), heavy industrial equipment, UPS and Telecom systems for power delivery and memory backup.

Expected prelims question:

Element used by supercapacitor is

- a) Oxygen
- b) Hydrogen
- c) Platinum
- d) Graphene

Ans - d

Expected mains question

lithium-ion batteries are used widely and disposed after they run out, leading to mounting e-waste. Discuss the measure take by scientists to reduce the e-waste