

4. Supercapacitors, Ragone Plot

17 November 2023 08:35

CAPACITORS

- High power density
- No redox reactions
- Storage in terms of μF
- Rapid charging and discharging

$$Q \propto V$$

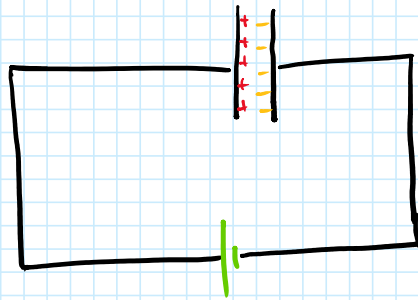
$$Q = CV$$

capacitance

$$C \propto A$$

$$C \propto \frac{1}{d}$$

$$C = \frac{\epsilon A}{d}$$



SUPERCAPACITORS

- High power density
- High cycle life
- Safe
- Storage of electrical double
- No redox reactions
- Rapid discharging and charging

Also called ultracapacitors, EDLC

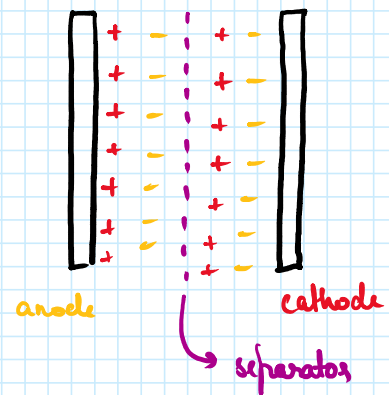
Electrical Double Layer Capacitors

Anode: Porous carbon / graphene / carbon nanotubes

Cathode: Porous carbon / graphene / carbon nanotubes

Electrolyte: $\text{KOH} / \text{H}_2\text{SO}_4 / \text{Na}_2\text{SO}_4$

Separator: Polypropylene



Disadvantages

Applications

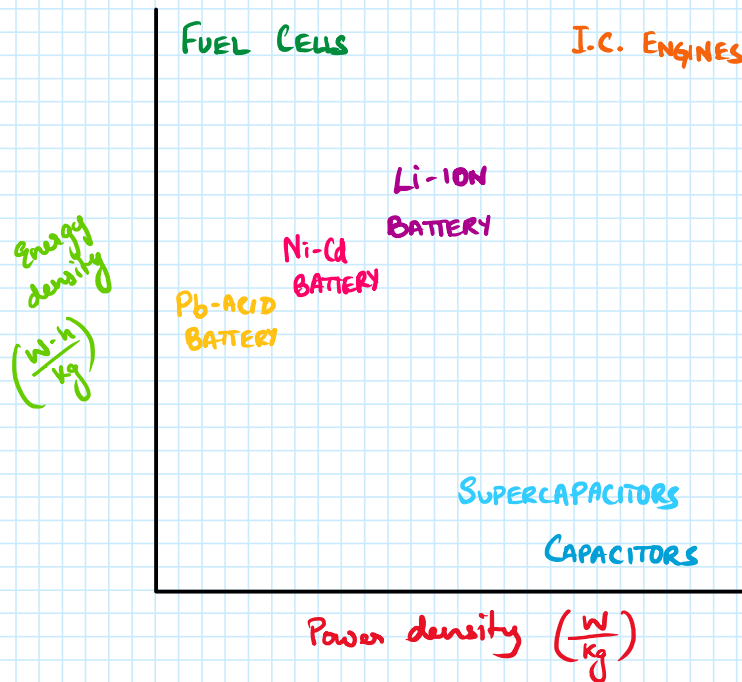
Disadvantages

- Low energy density
- Rapid discharging

Applications

- Hybrid cars
- Automobile industry

RAGONE PLOT



Supercapacitors: High PD, low ED