Material
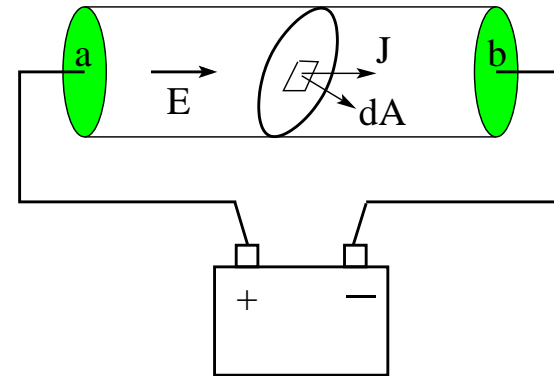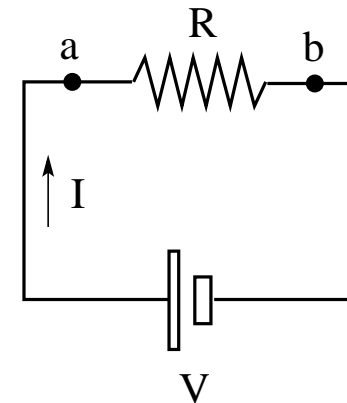
- $\vec{E}$: electric field
- $\vec{J}$: current density
- ρ: resistivity
- $\sigma = 1/\rho$: conductivity
- $\vec{E} = \rho\vec{J}, \quad \vec{J} = \sigma\vec{E}$

Device

- V: voltage
- I: electric current
- R: resistance
- $V = RI$

Current from current density: $I = \displaystyle\int \vec{J} \cdot d\vec{A}$

Voltage from electric field: $V = -\displaystyle\int_a^b \vec{E} \cdot d\vec{s}$