Graphene based nanoelectronics – a practical approach

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Univerza v Novi Gorici

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EIT HEI Initiative

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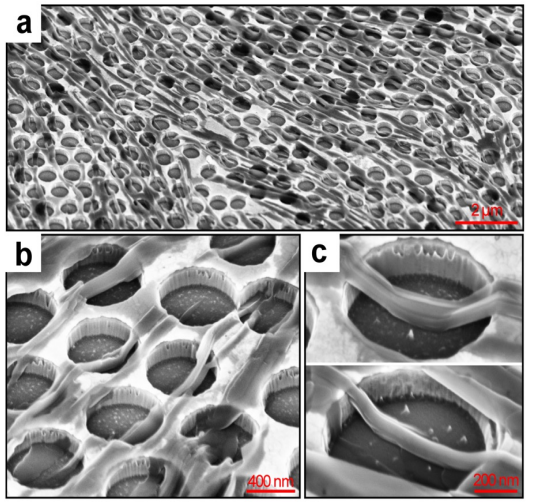
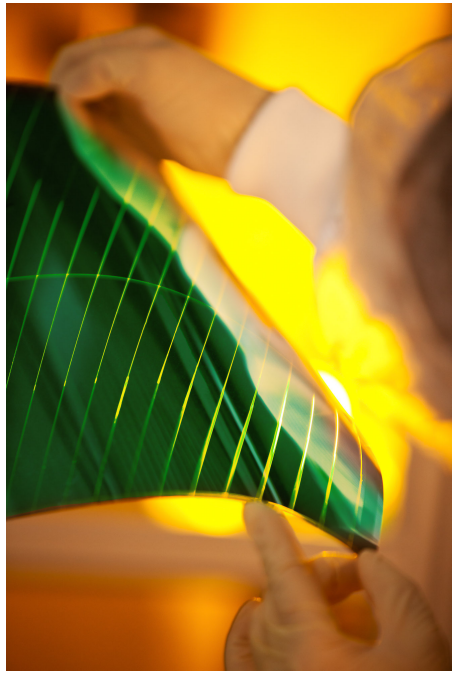
Outline

- Basics of Graphene transistor
- Overview of fabrication process
- Demonstration of graphene transistor fabrication
- Hands on – graphene exfoliation

Laboratory of organic matter physics

- OLEDs
- Solar cells
- Flexible electronics
- Graphene-based devices
- Photodetectors



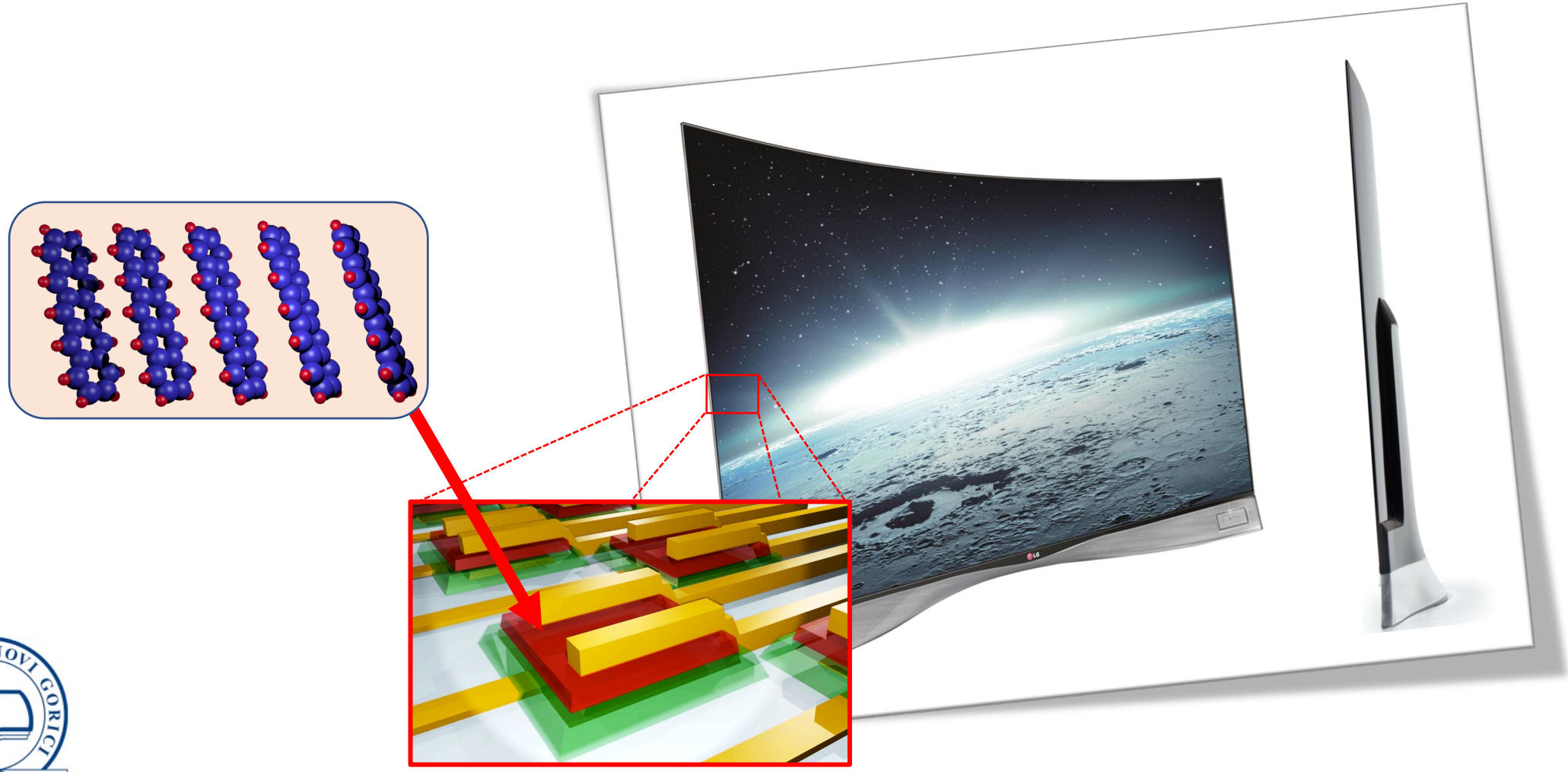


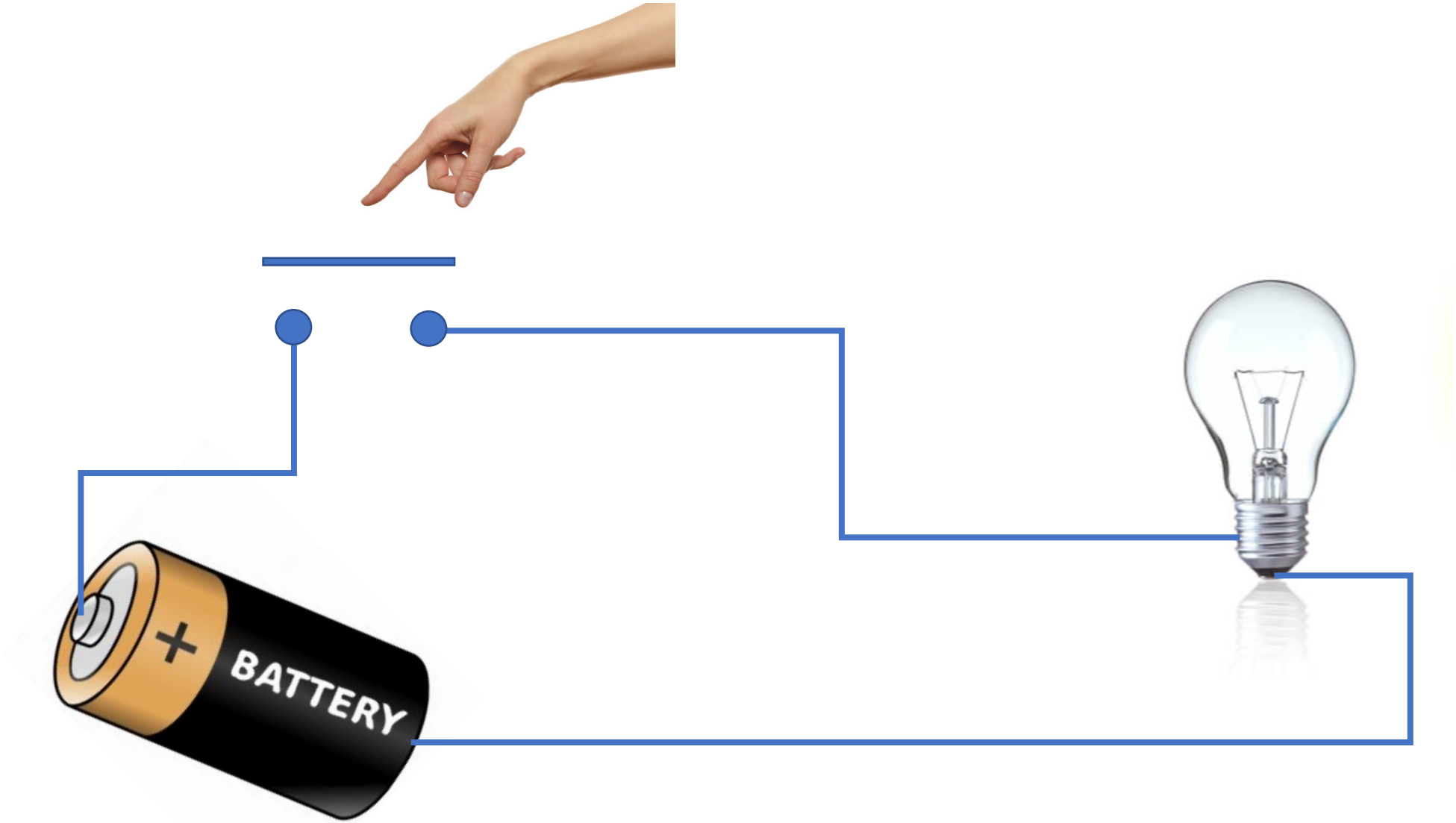
Flexible organic solar cells
(Solarfolie by Heliatek)

Flexible phones
Samsung Galaxy X

LG's and Samsung's OLED TVs
– diagonal 197cm (77") and 140 cm(55").

What is transistor?

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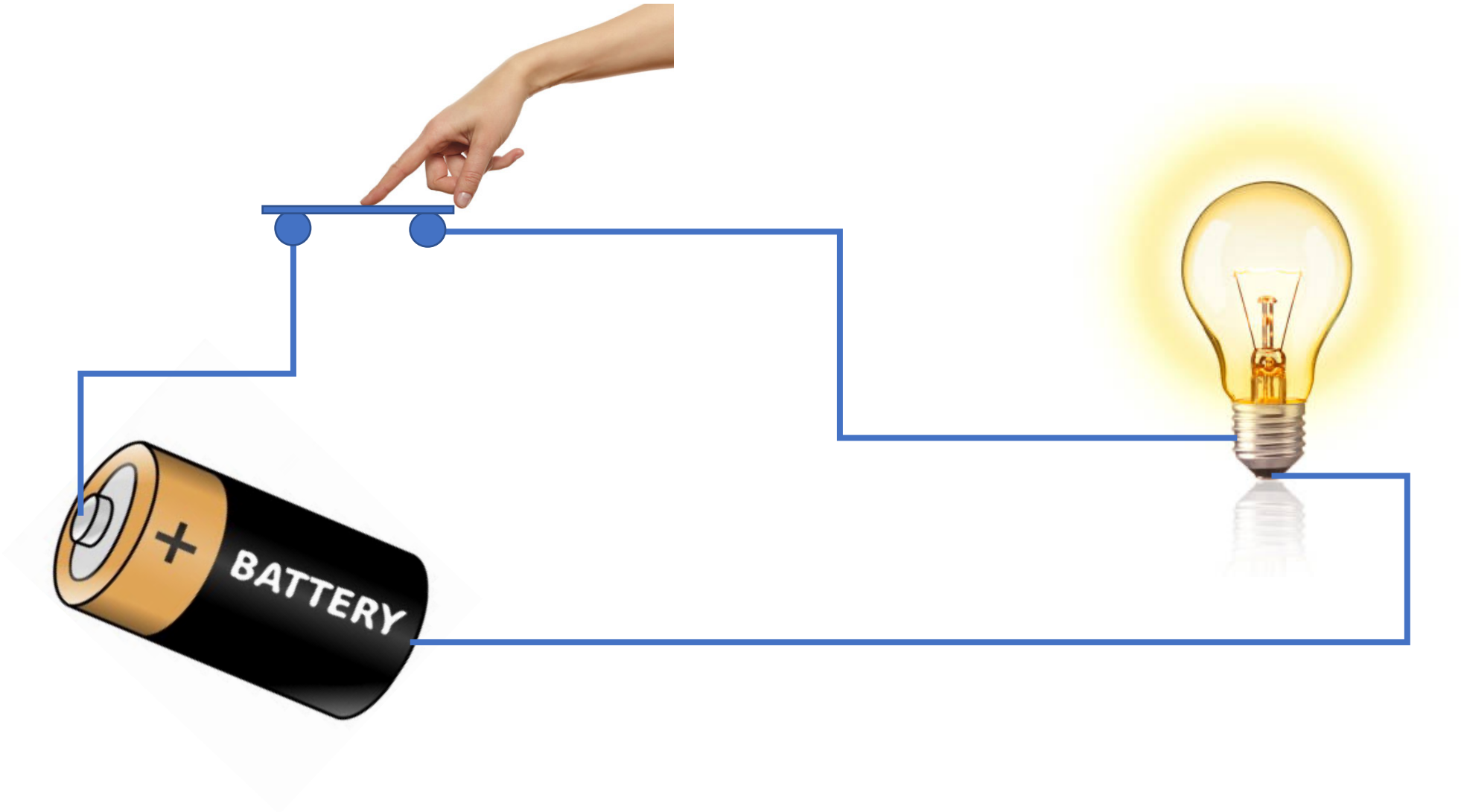
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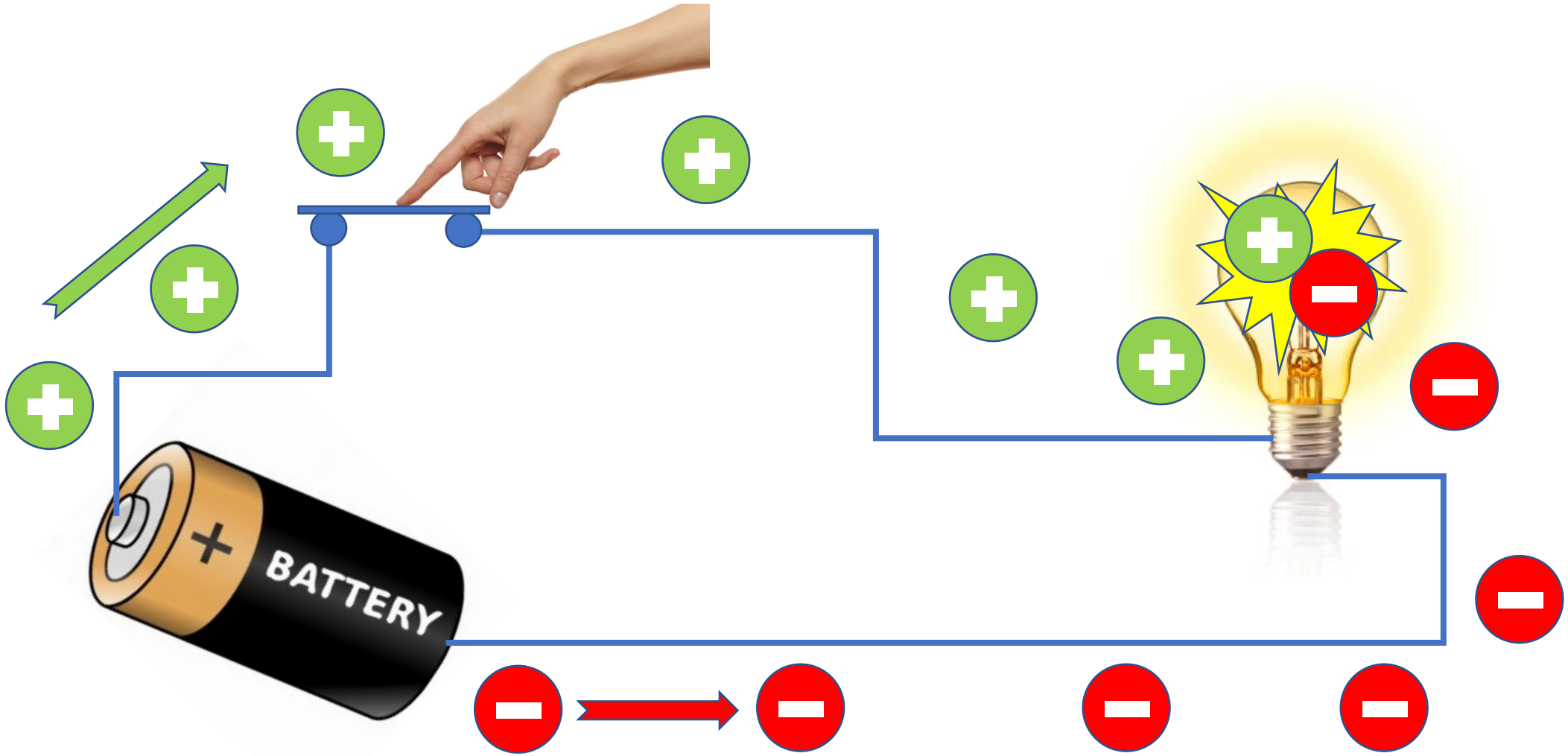
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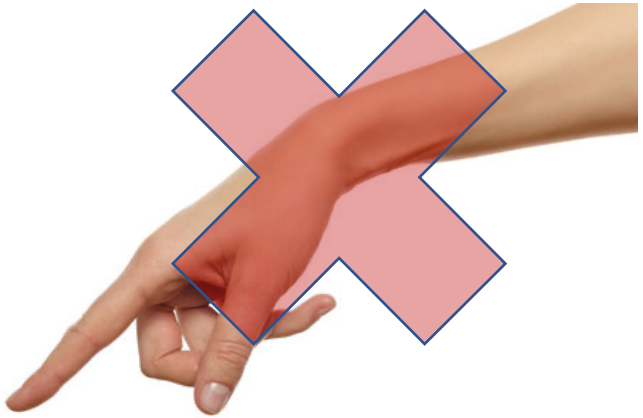
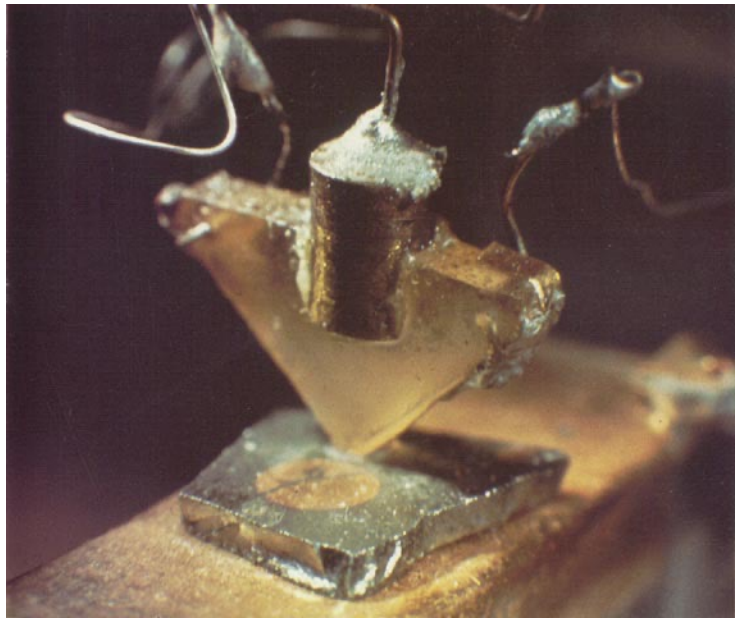
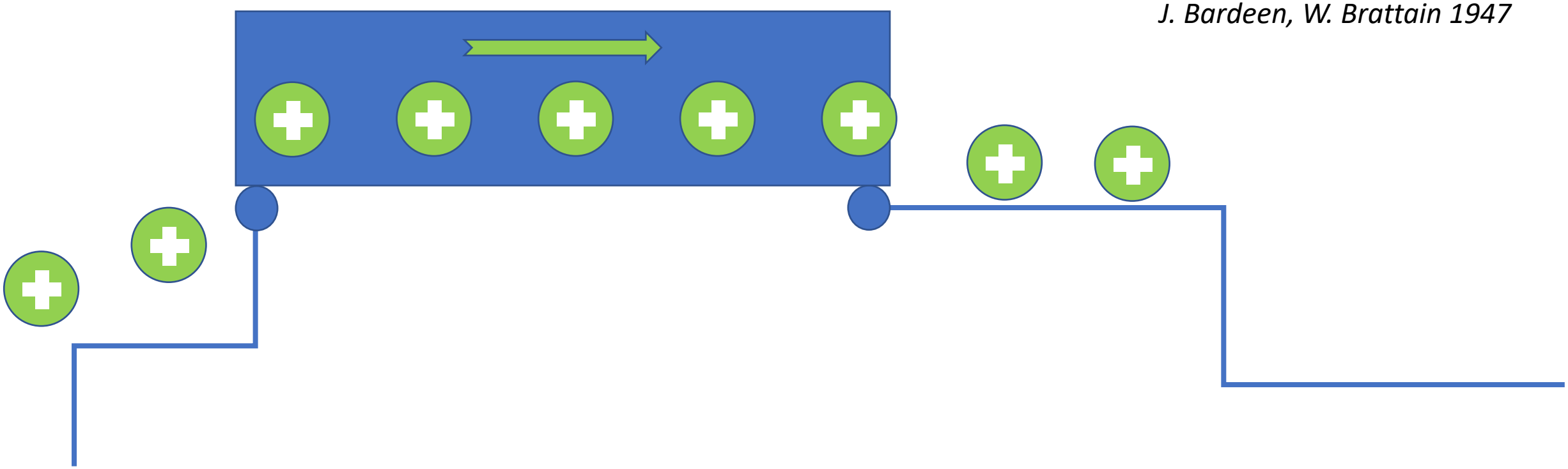
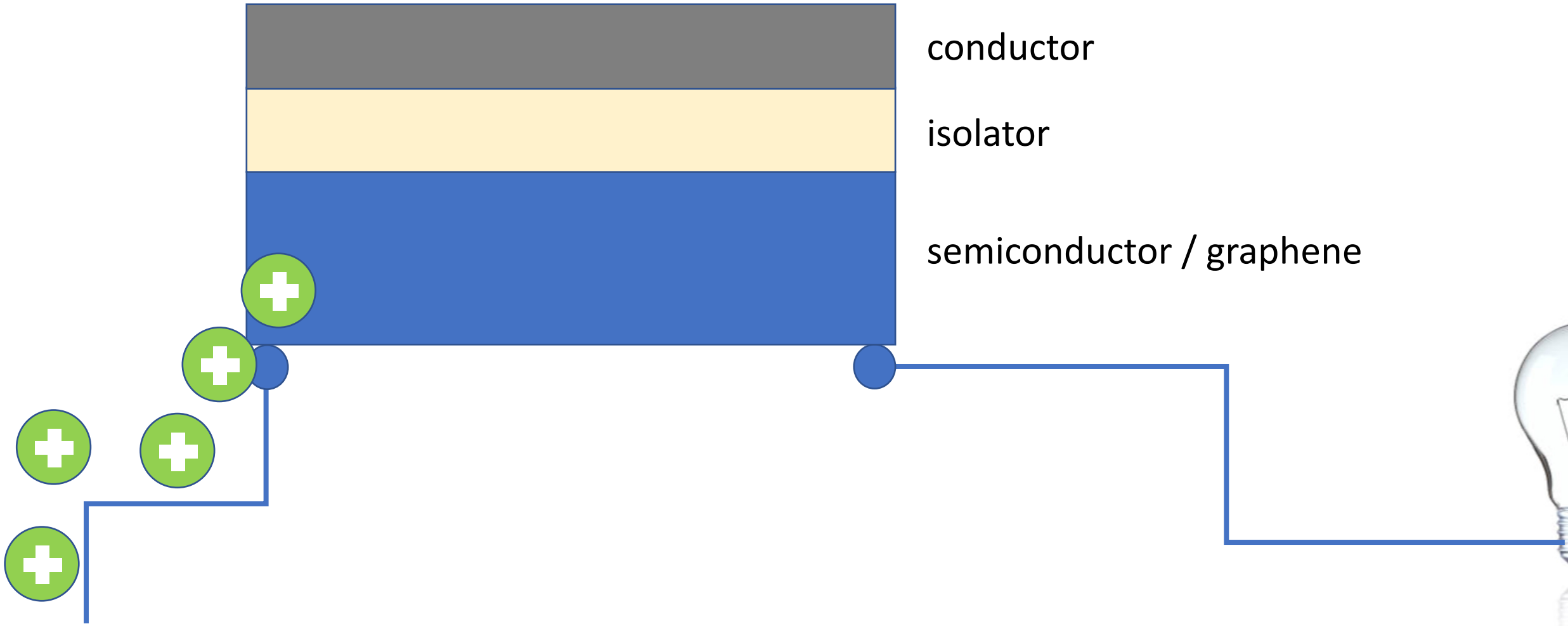




J. Bardeen, W. Brattain 1947

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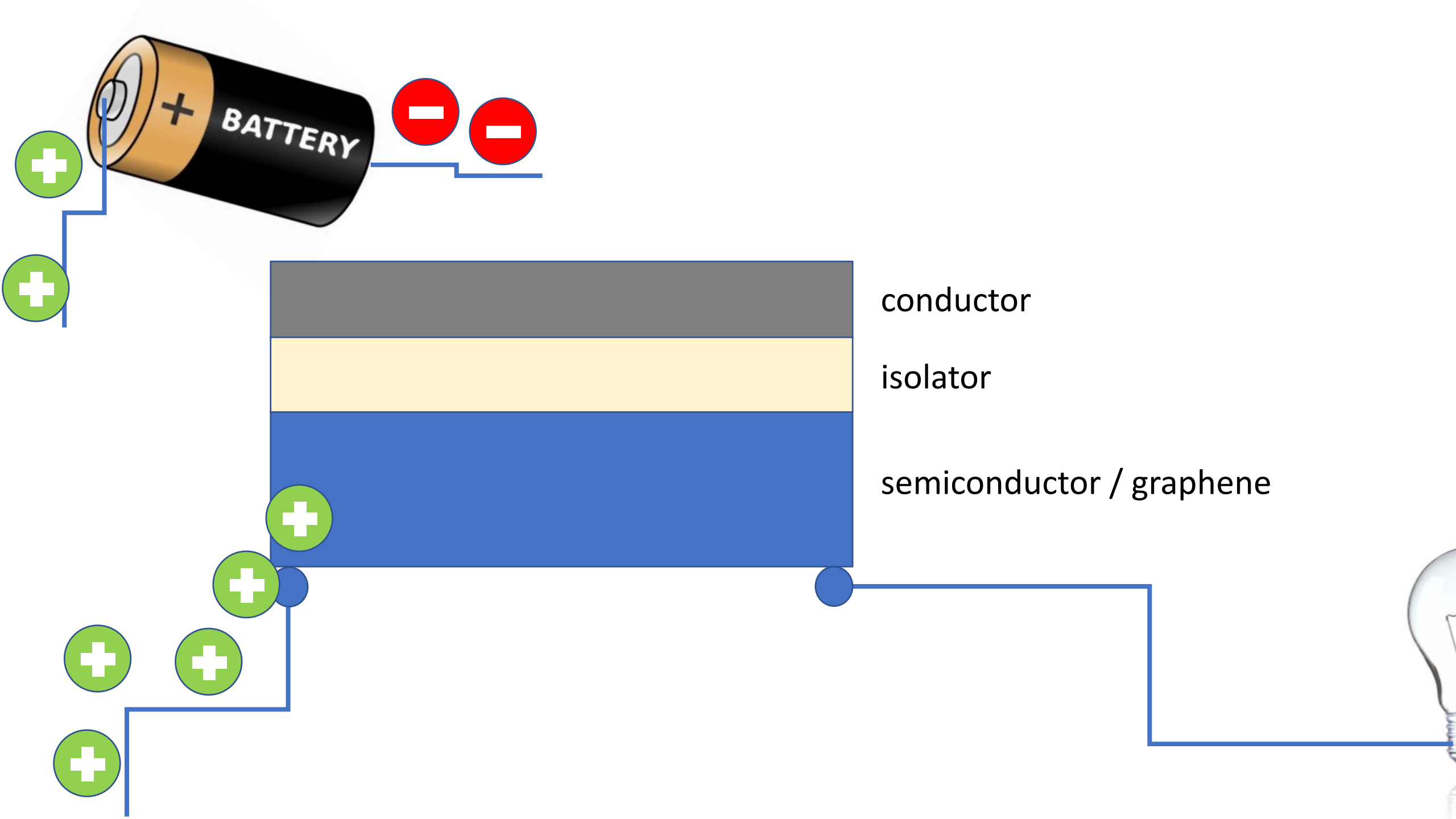
isolator
semiconductor / graphene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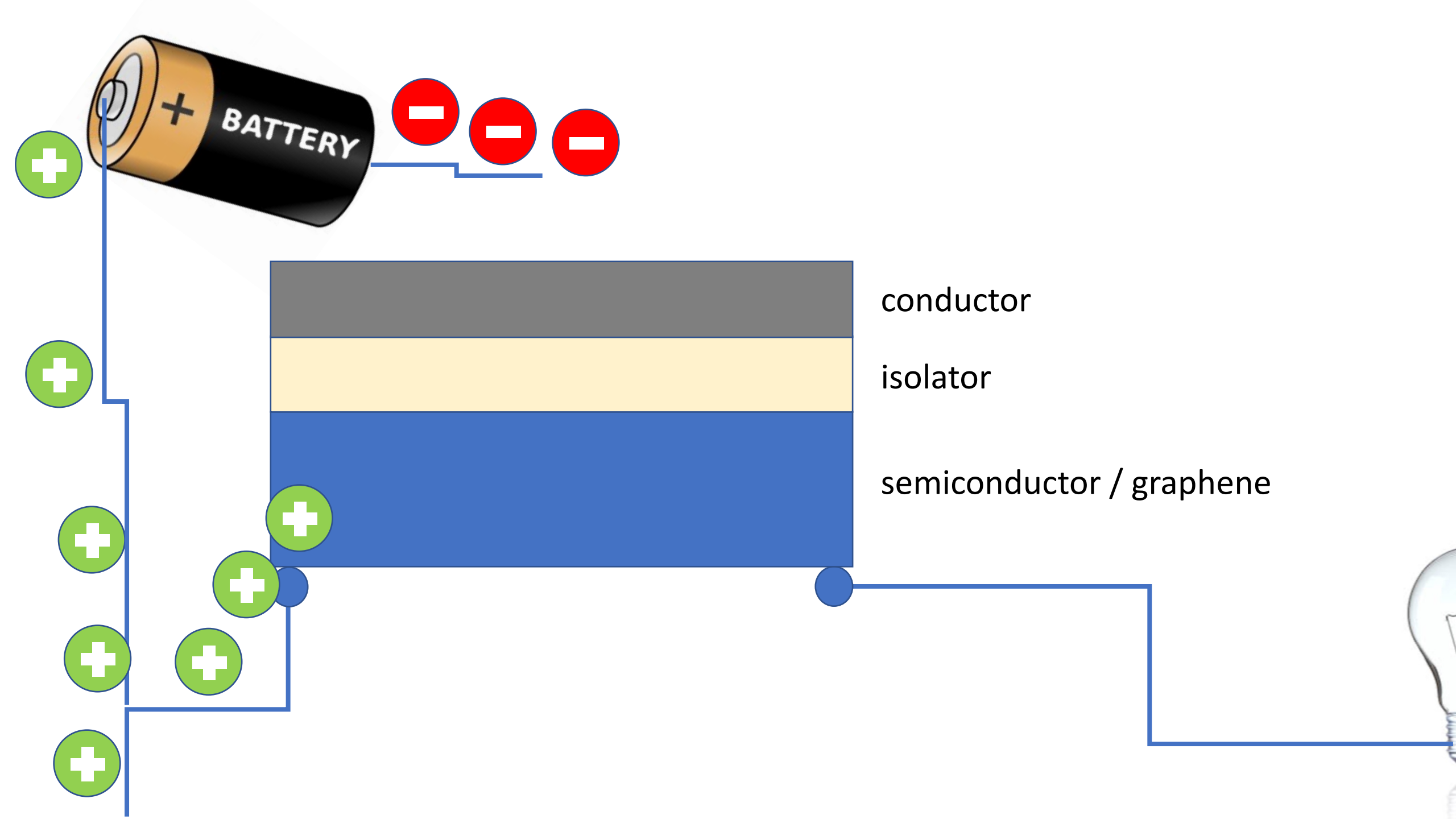
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conductor
isolator
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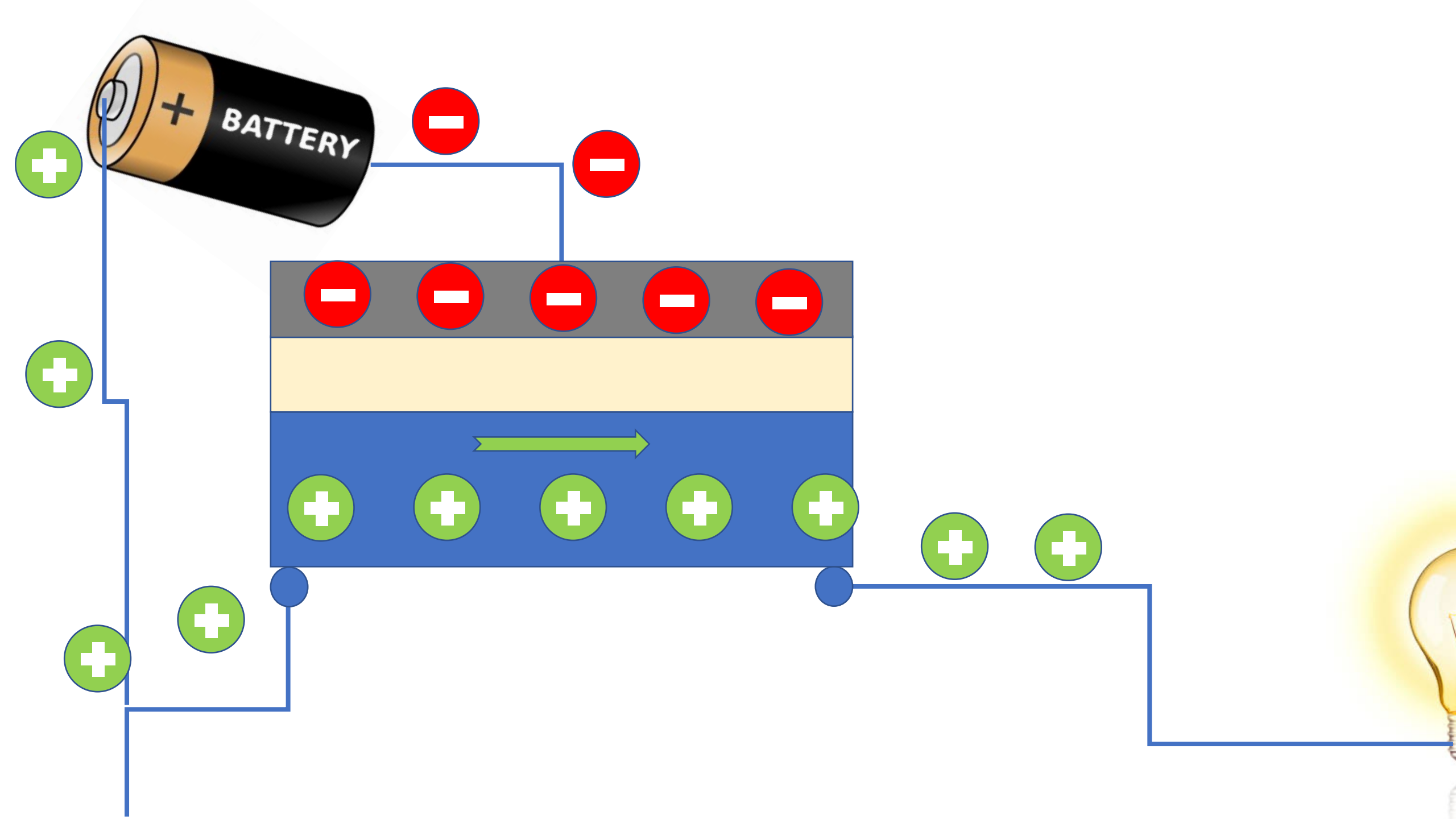
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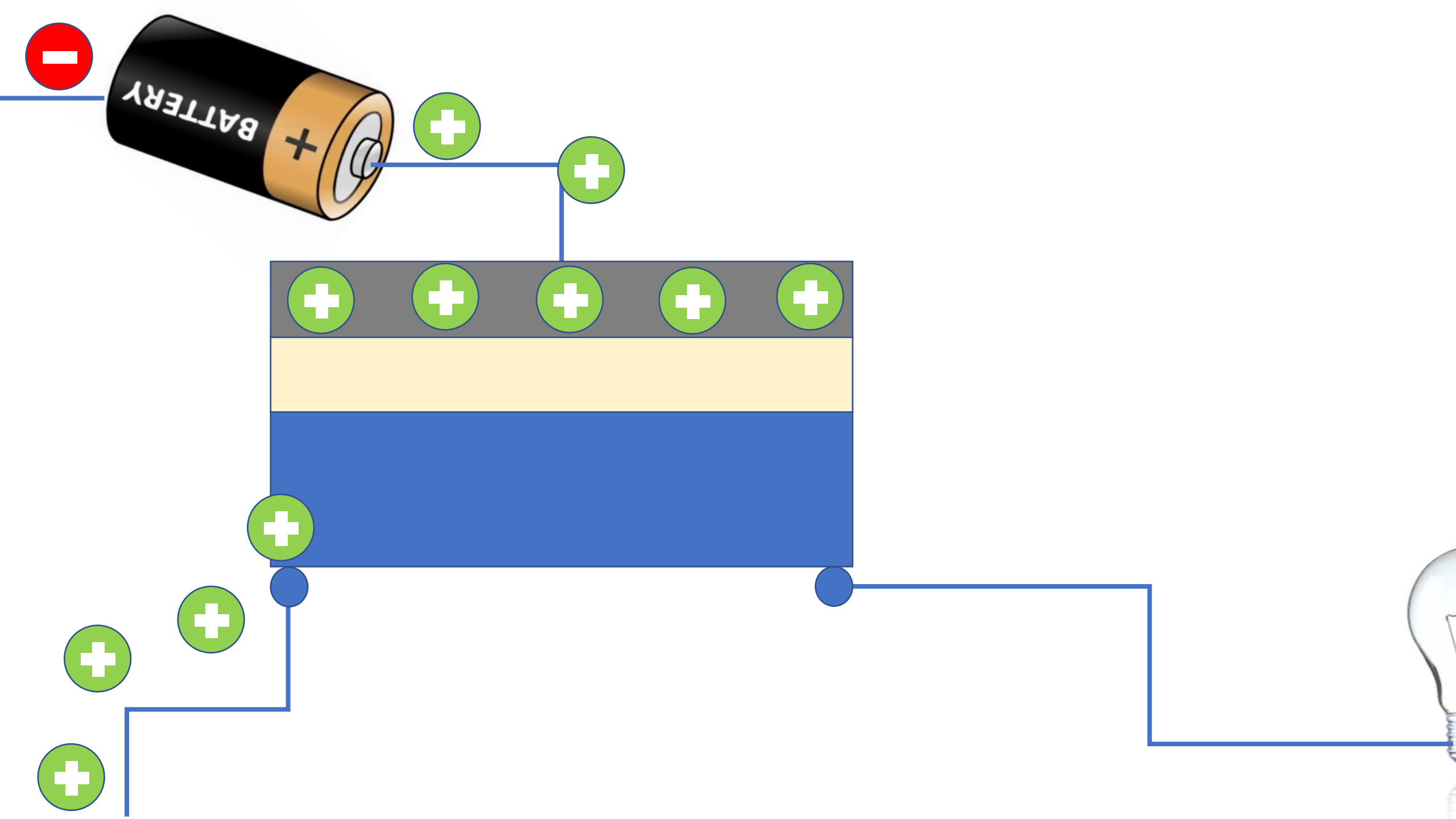
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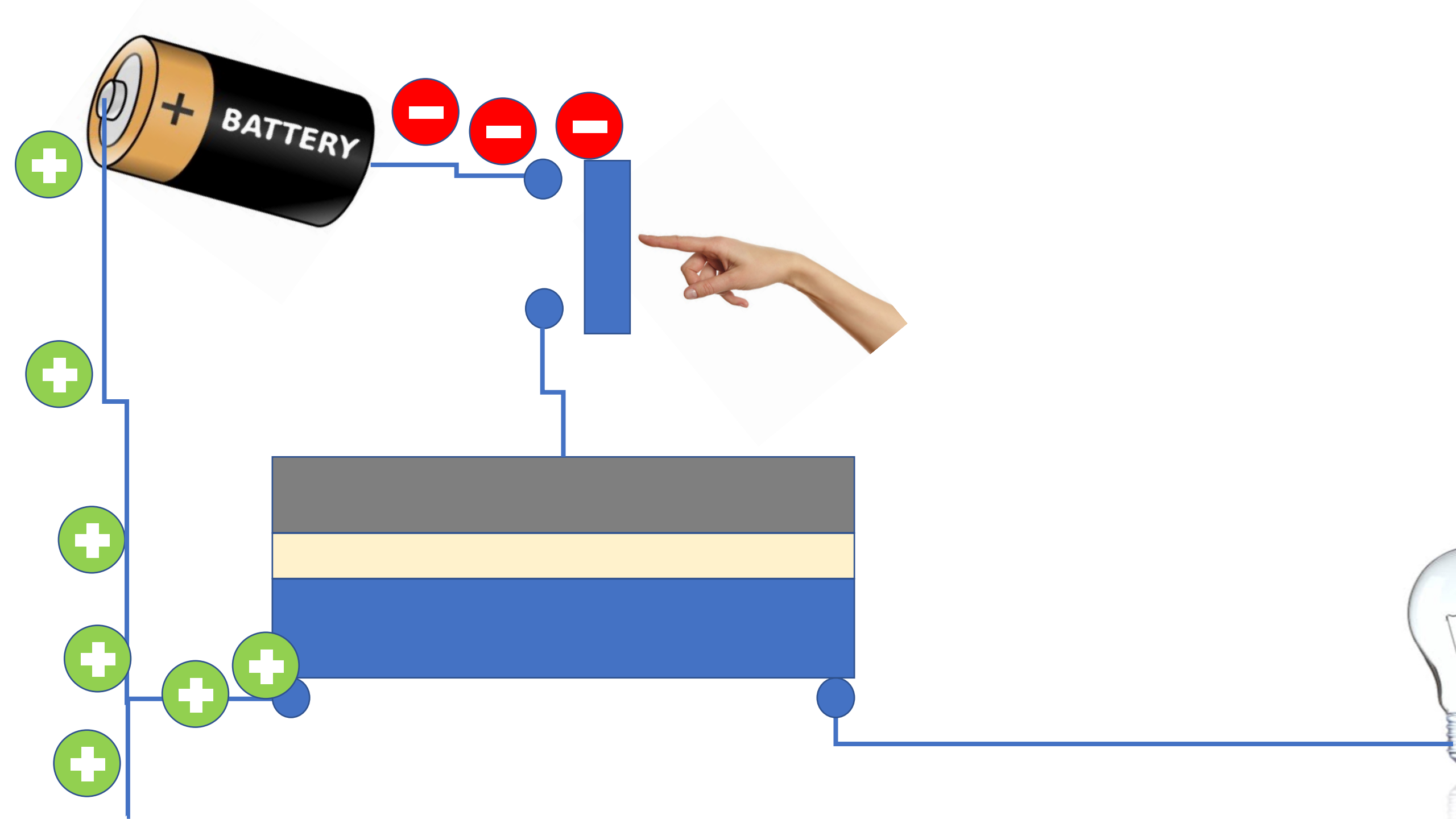
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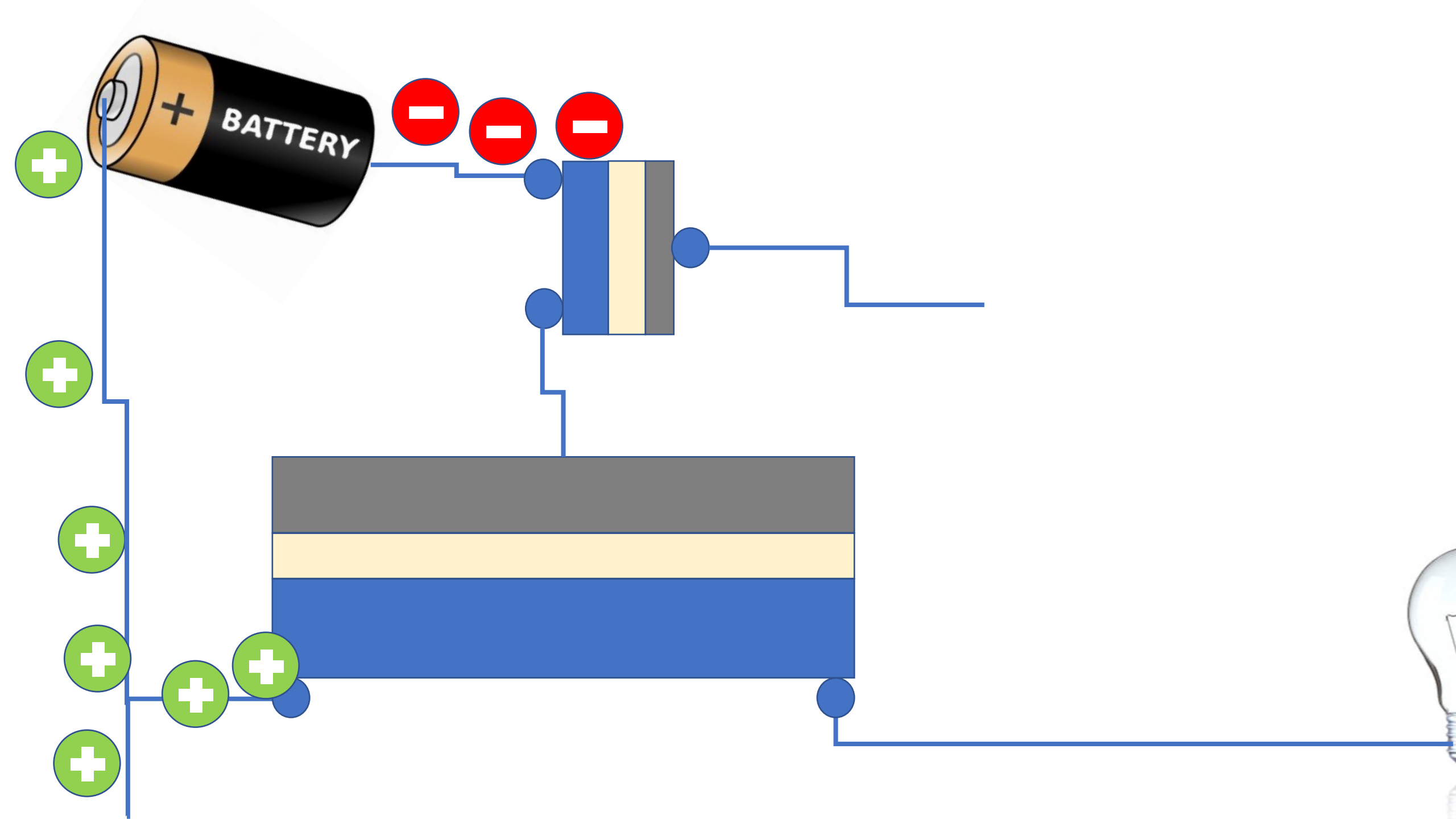
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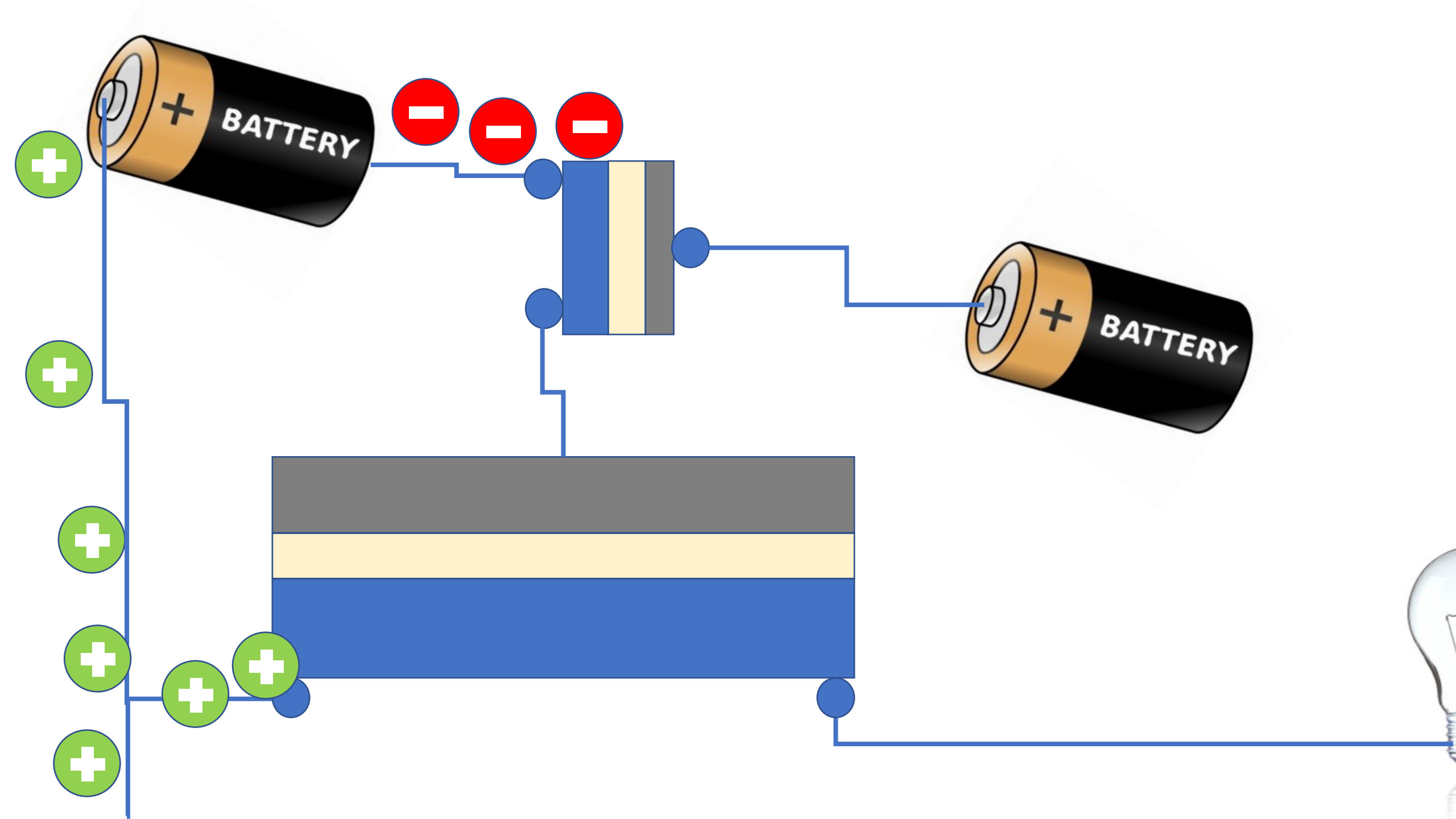
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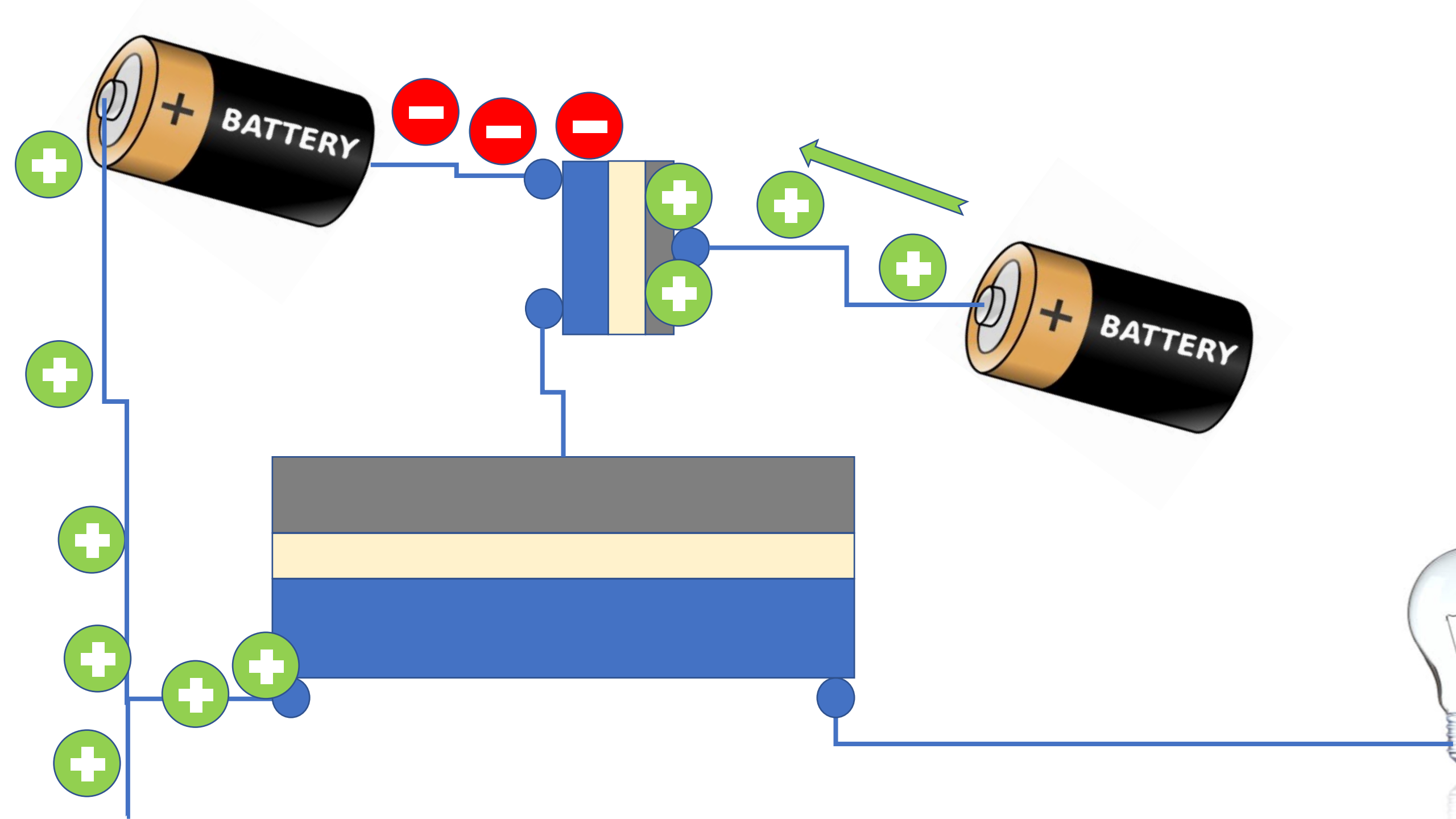
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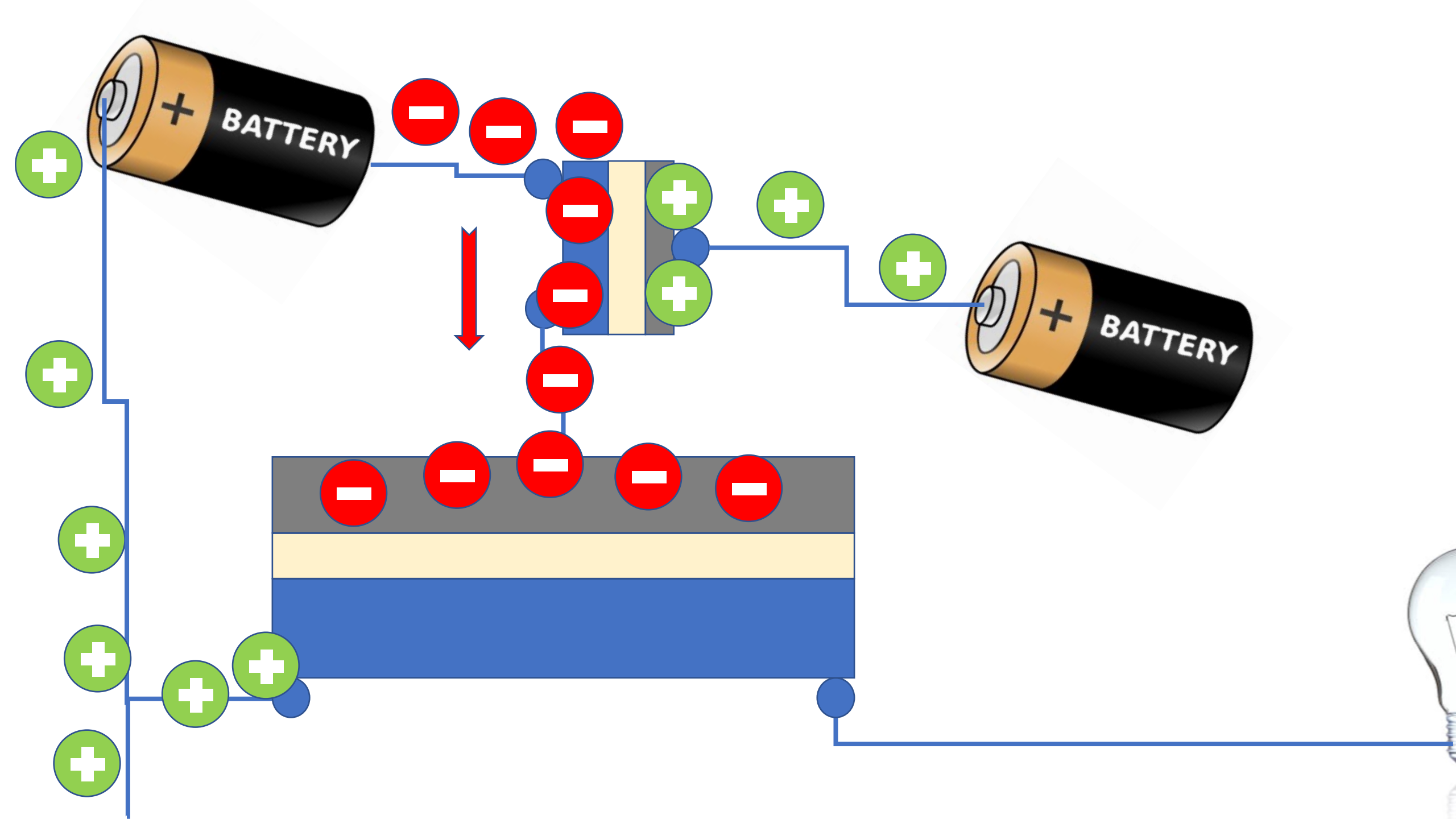
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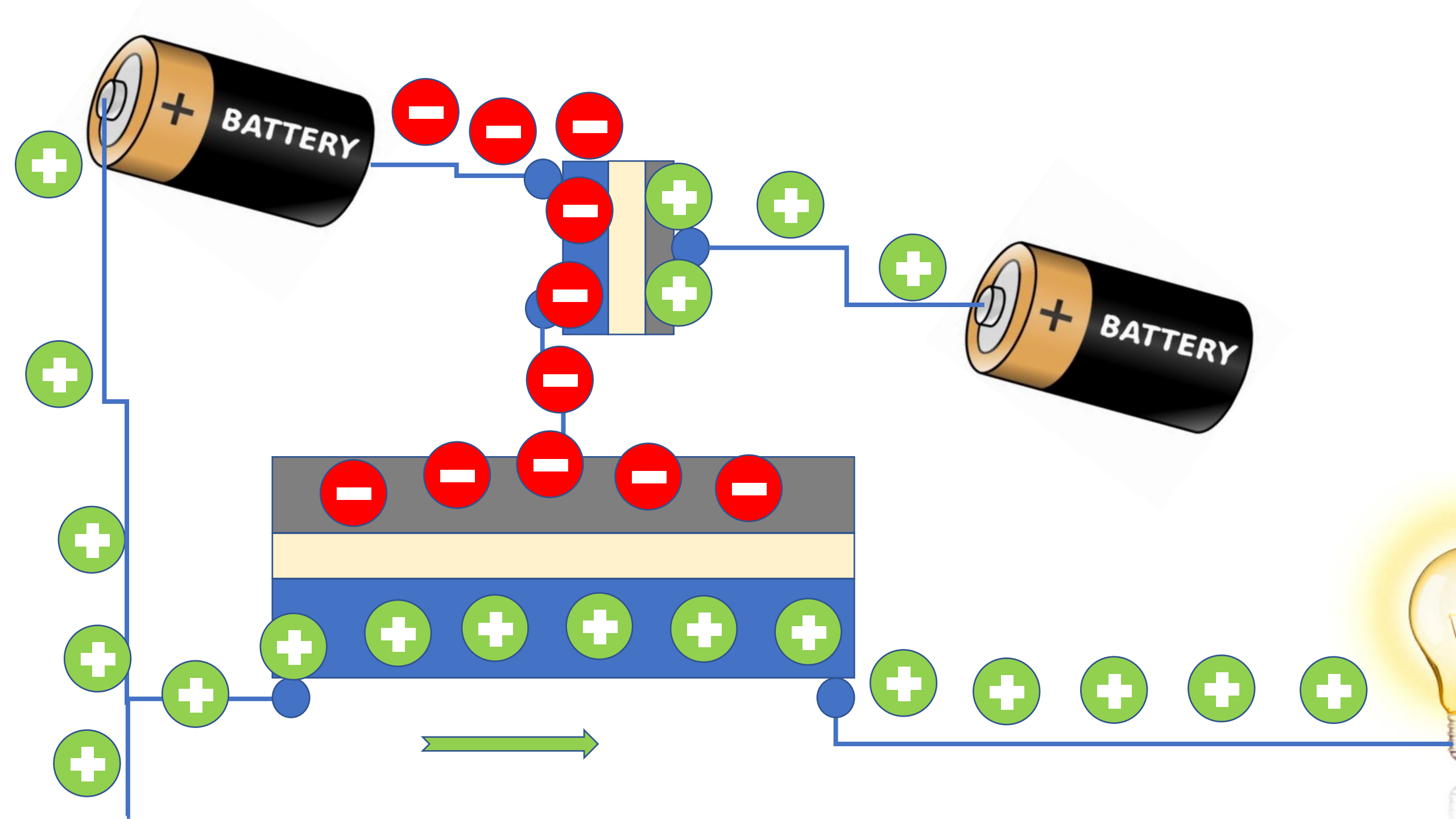
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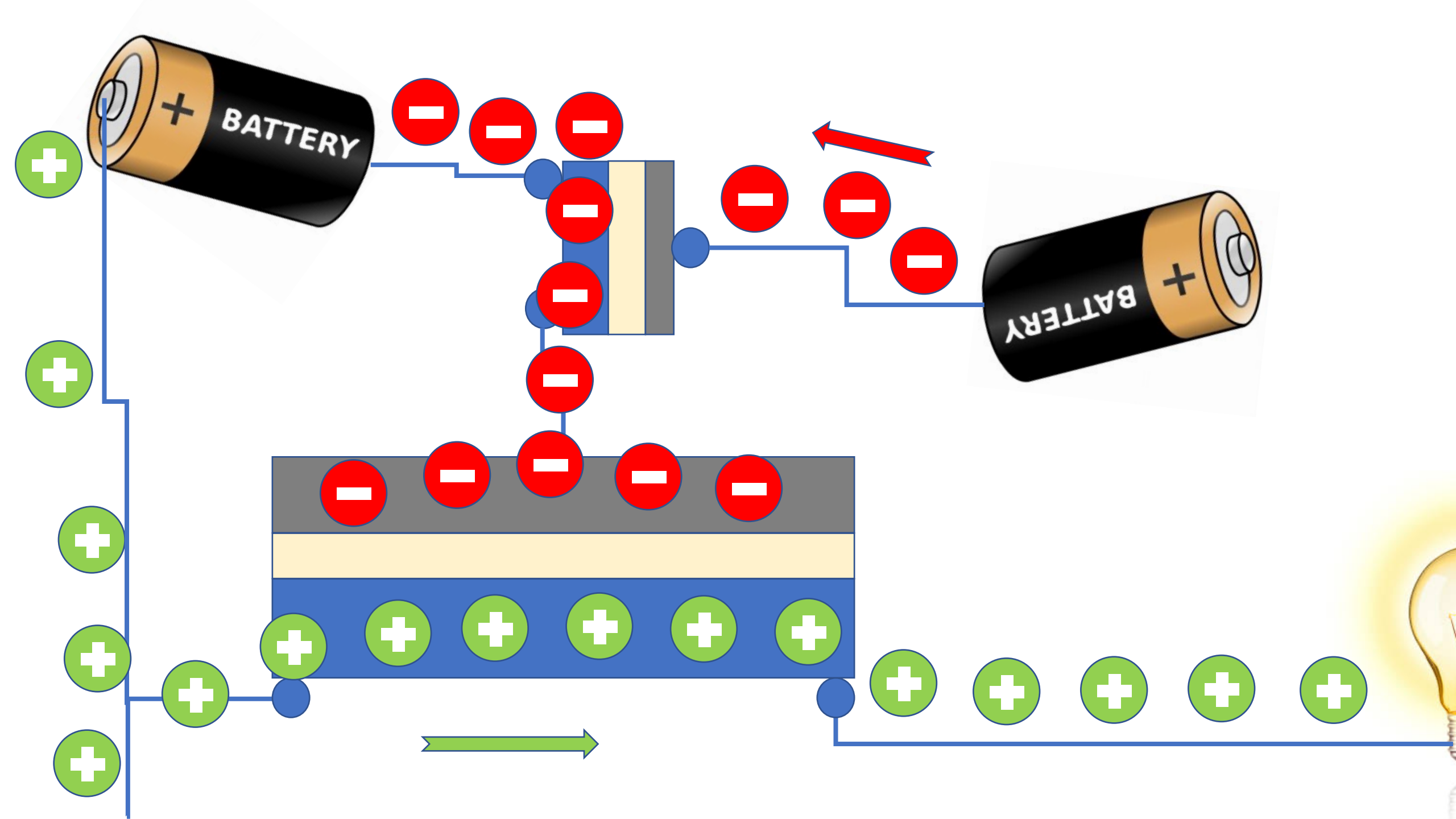
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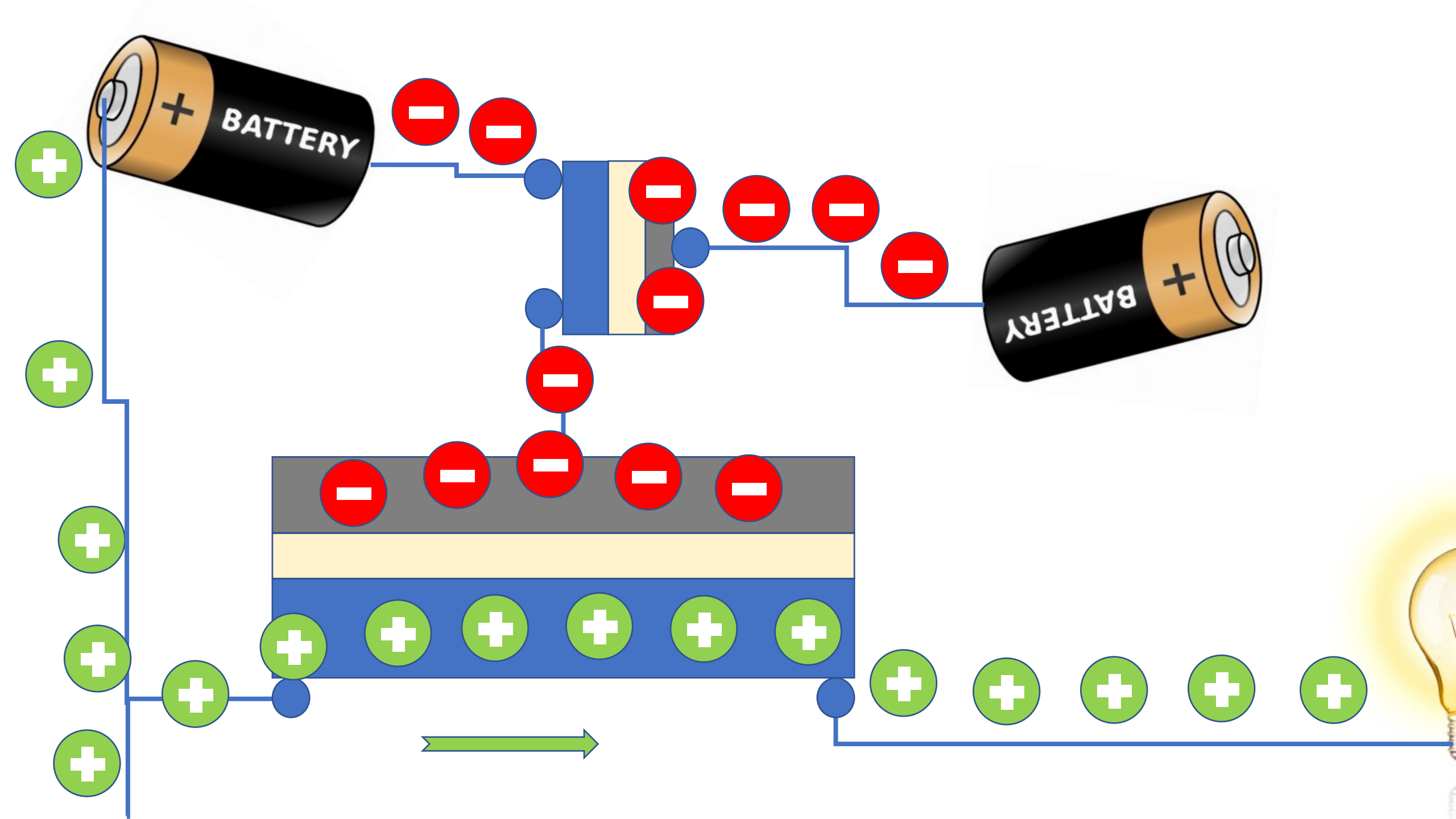
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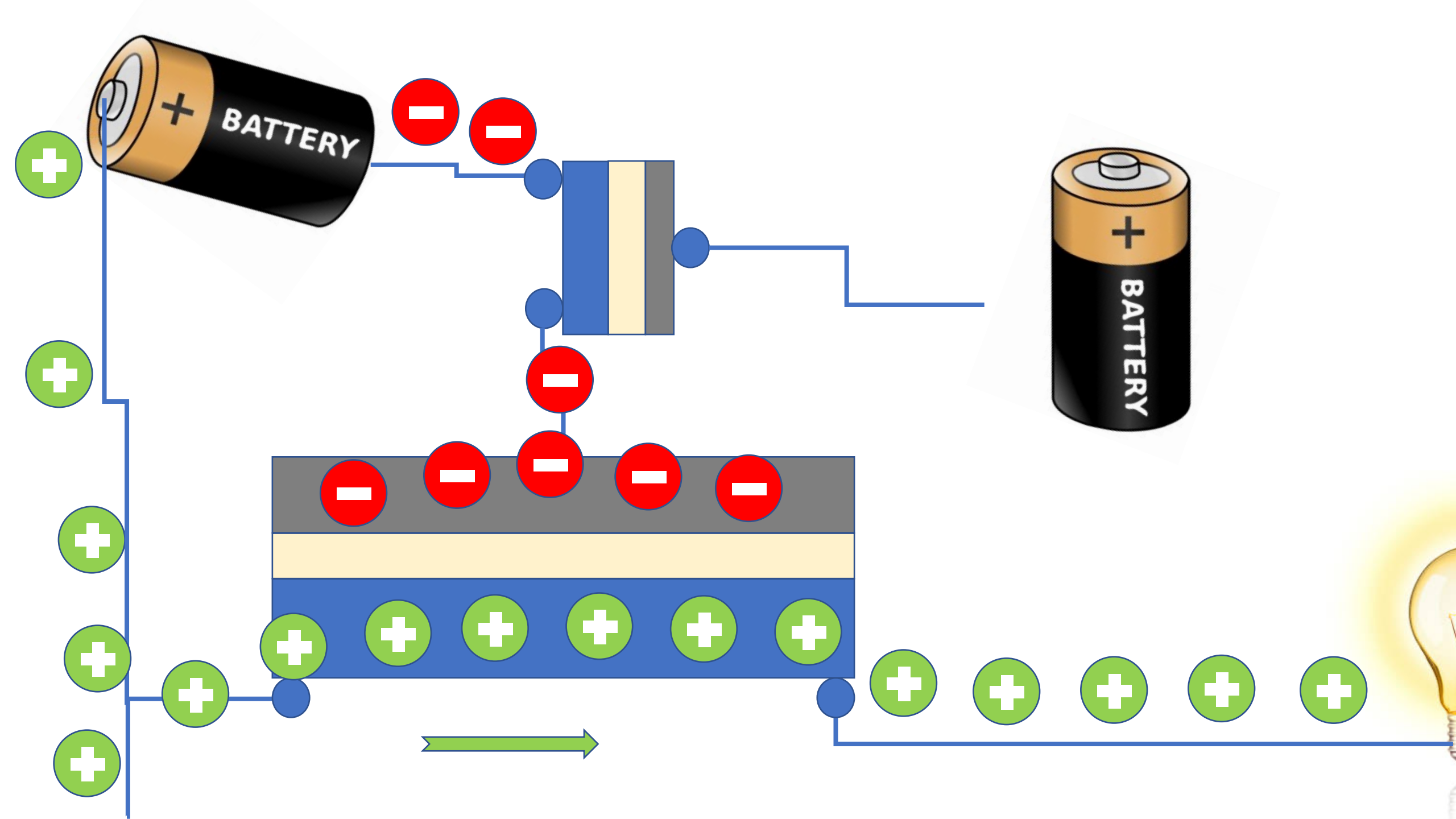
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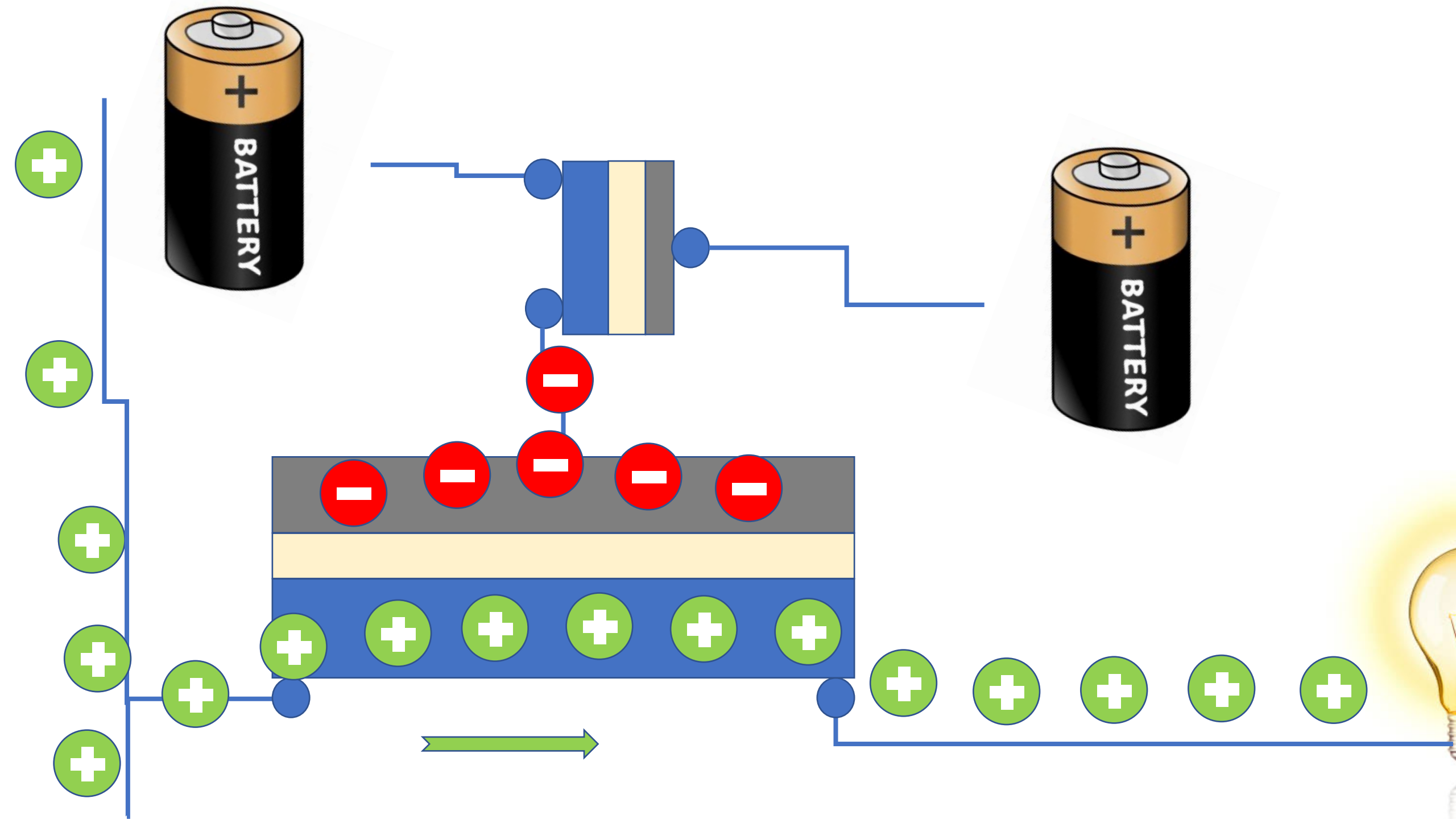
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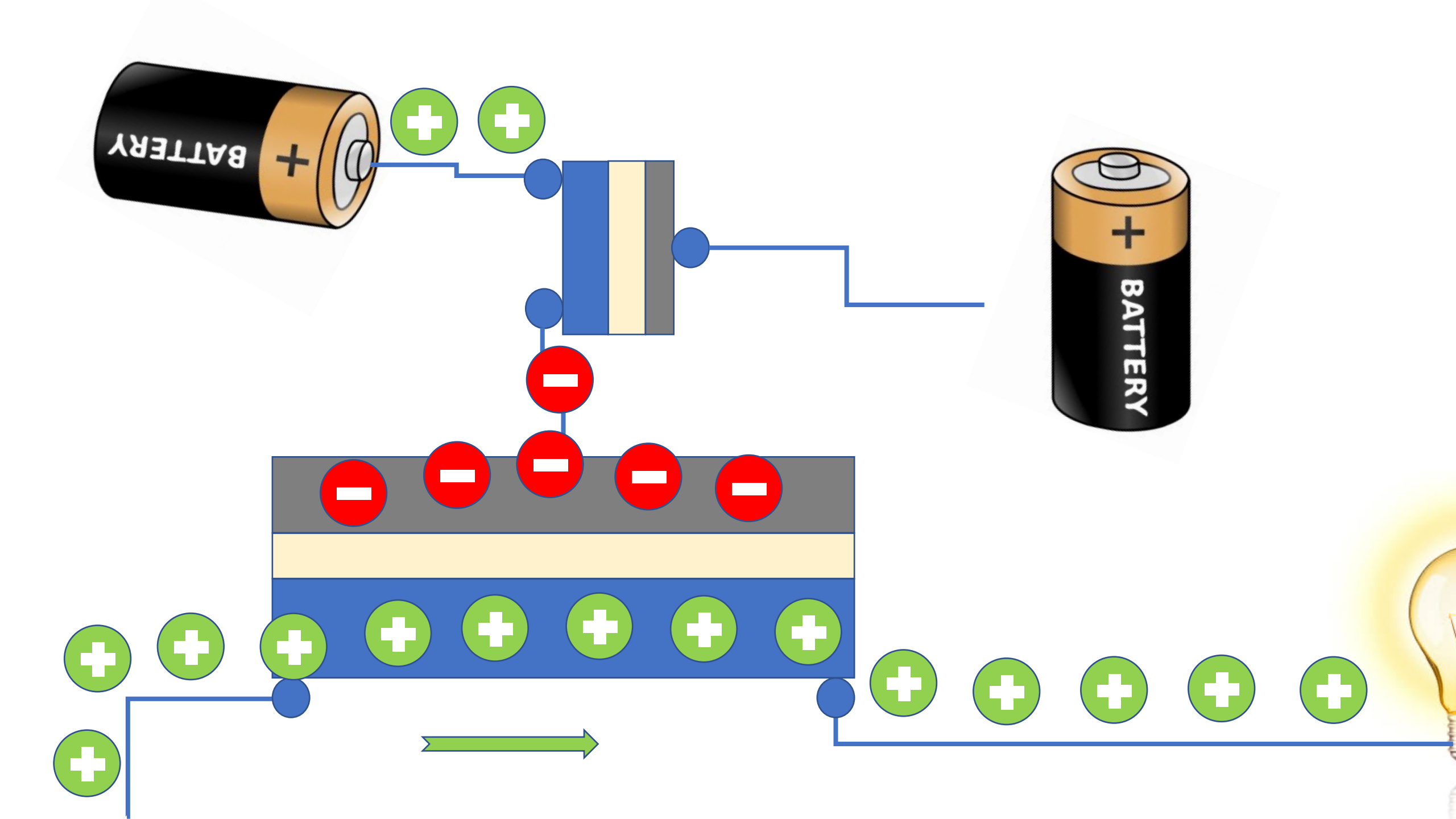
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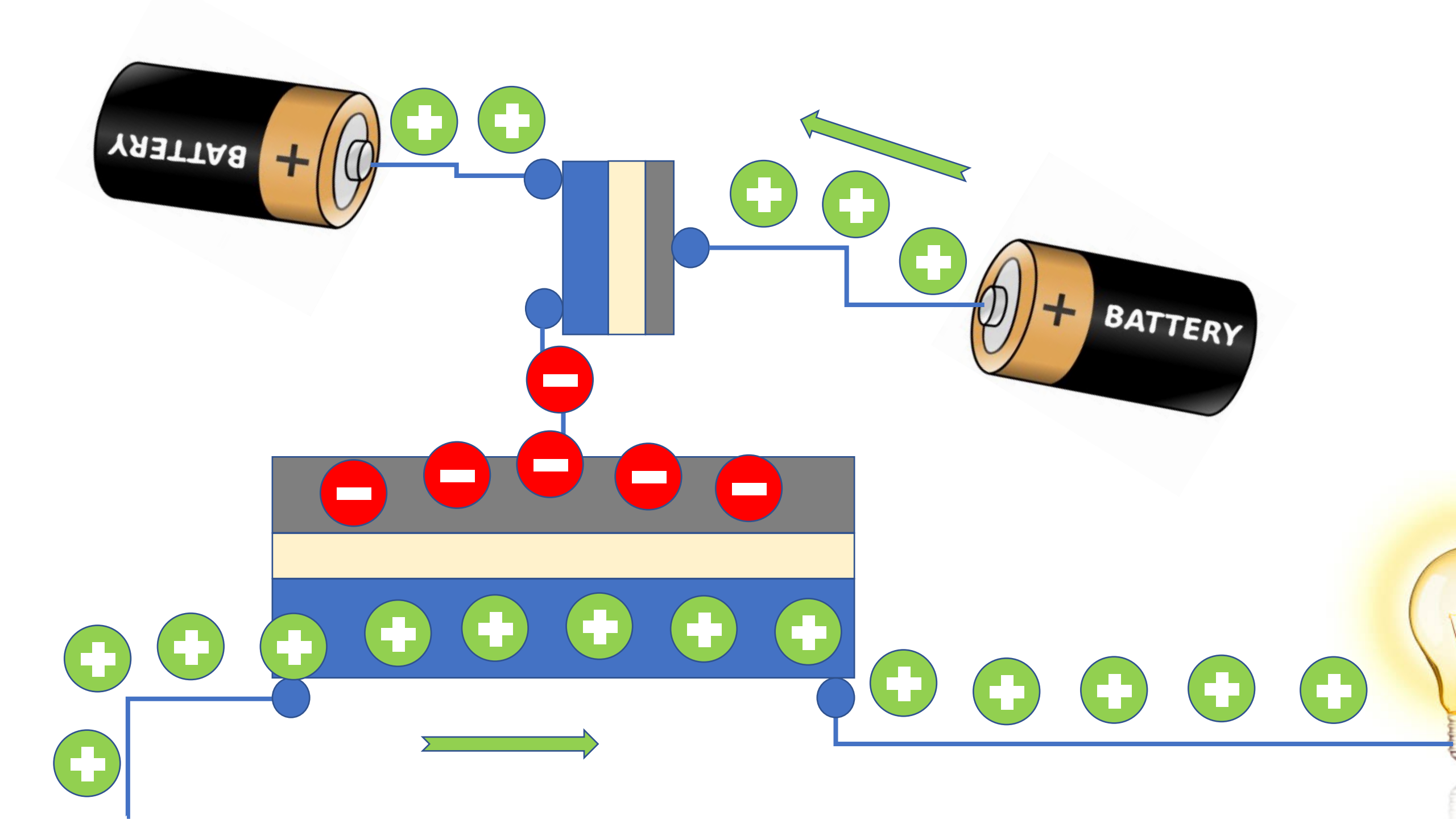
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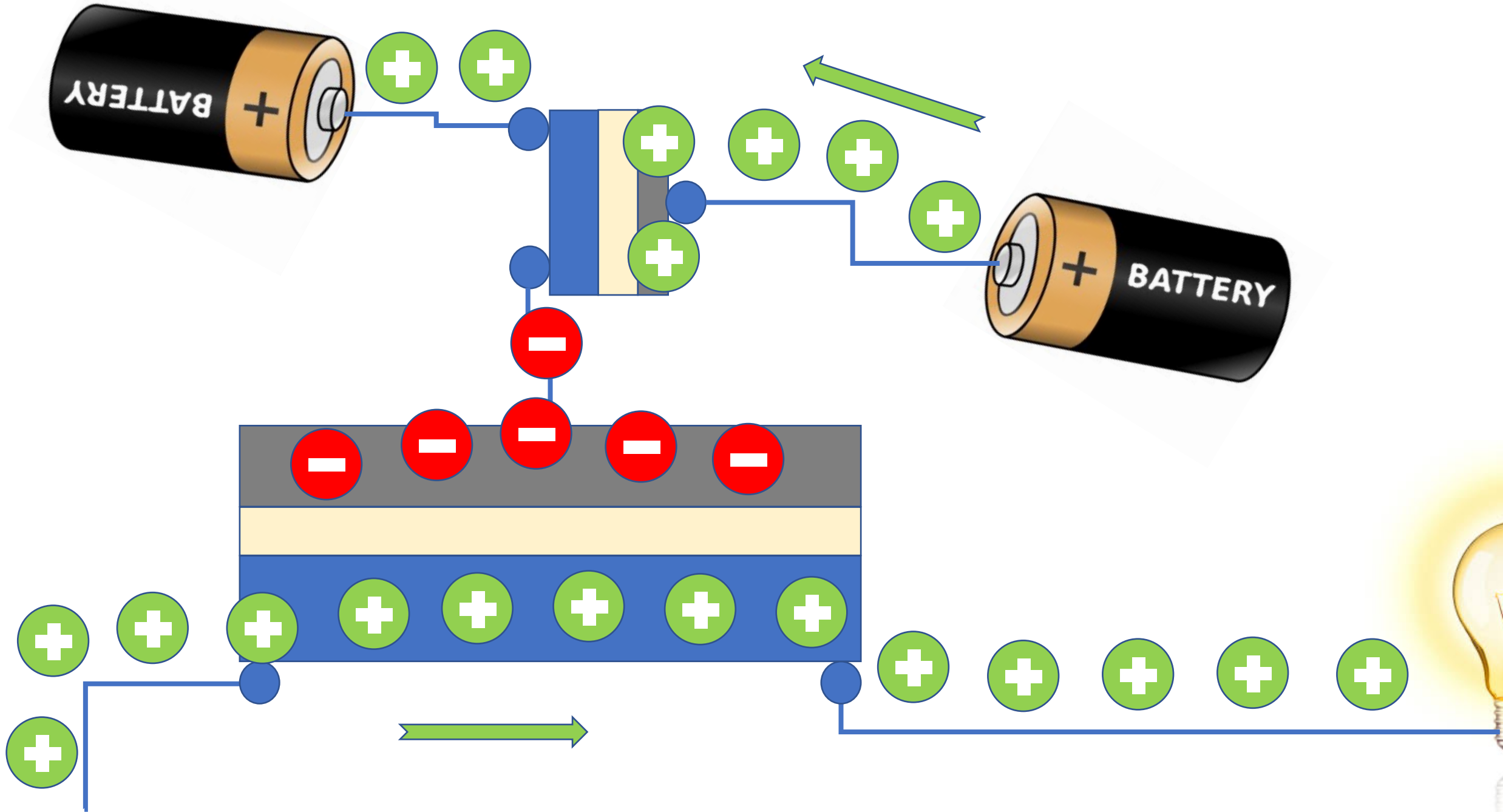
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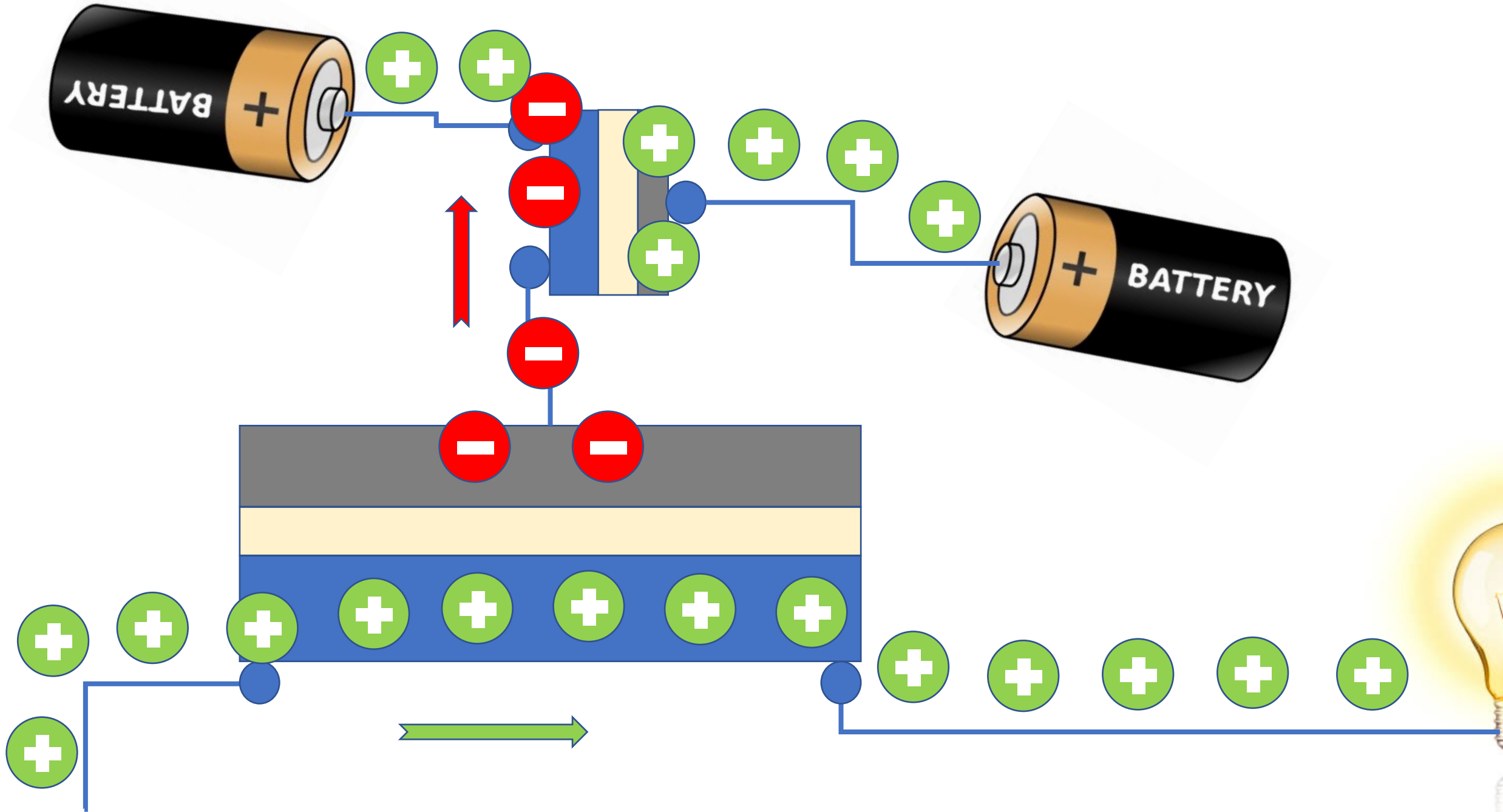
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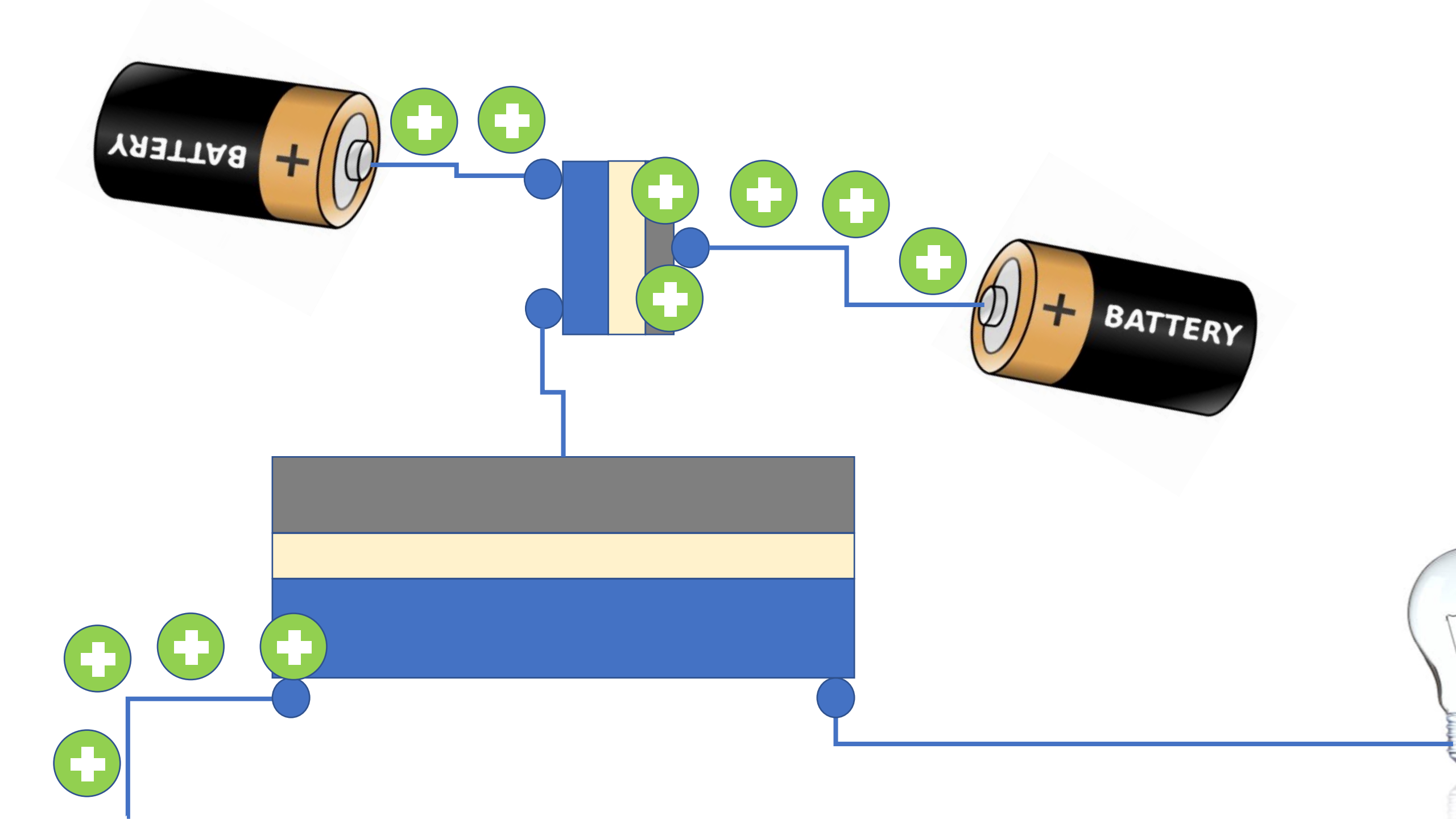
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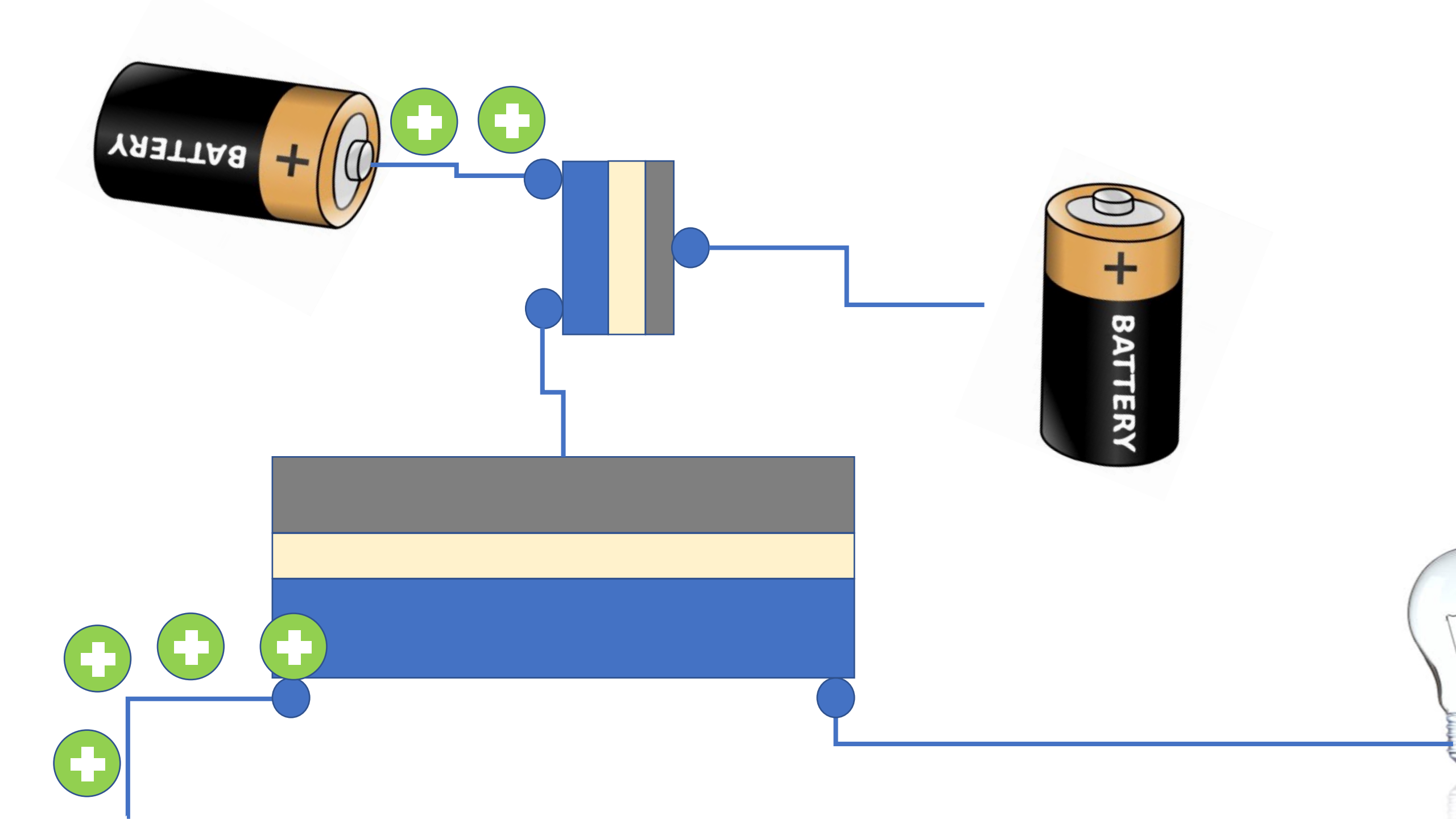
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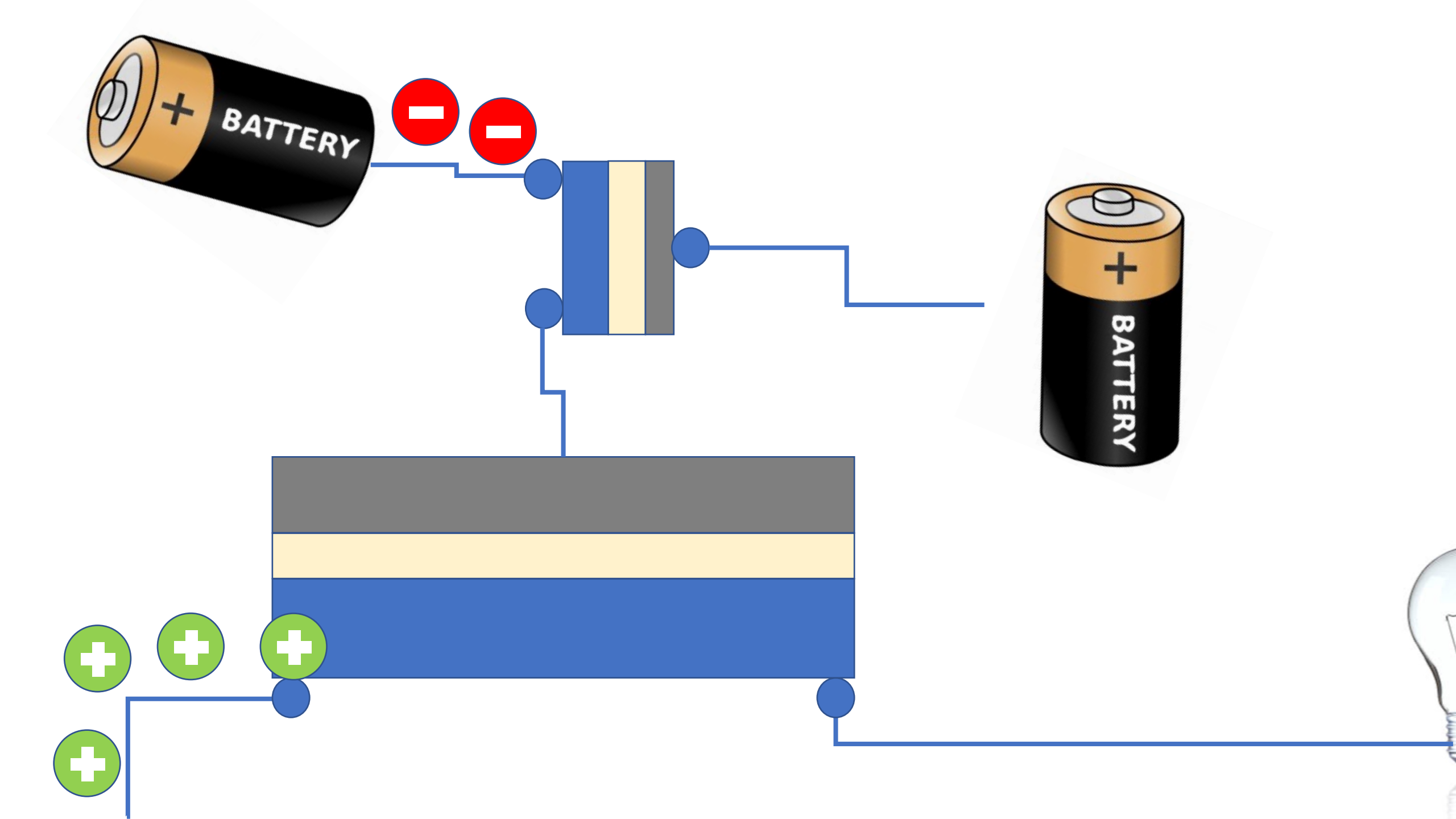
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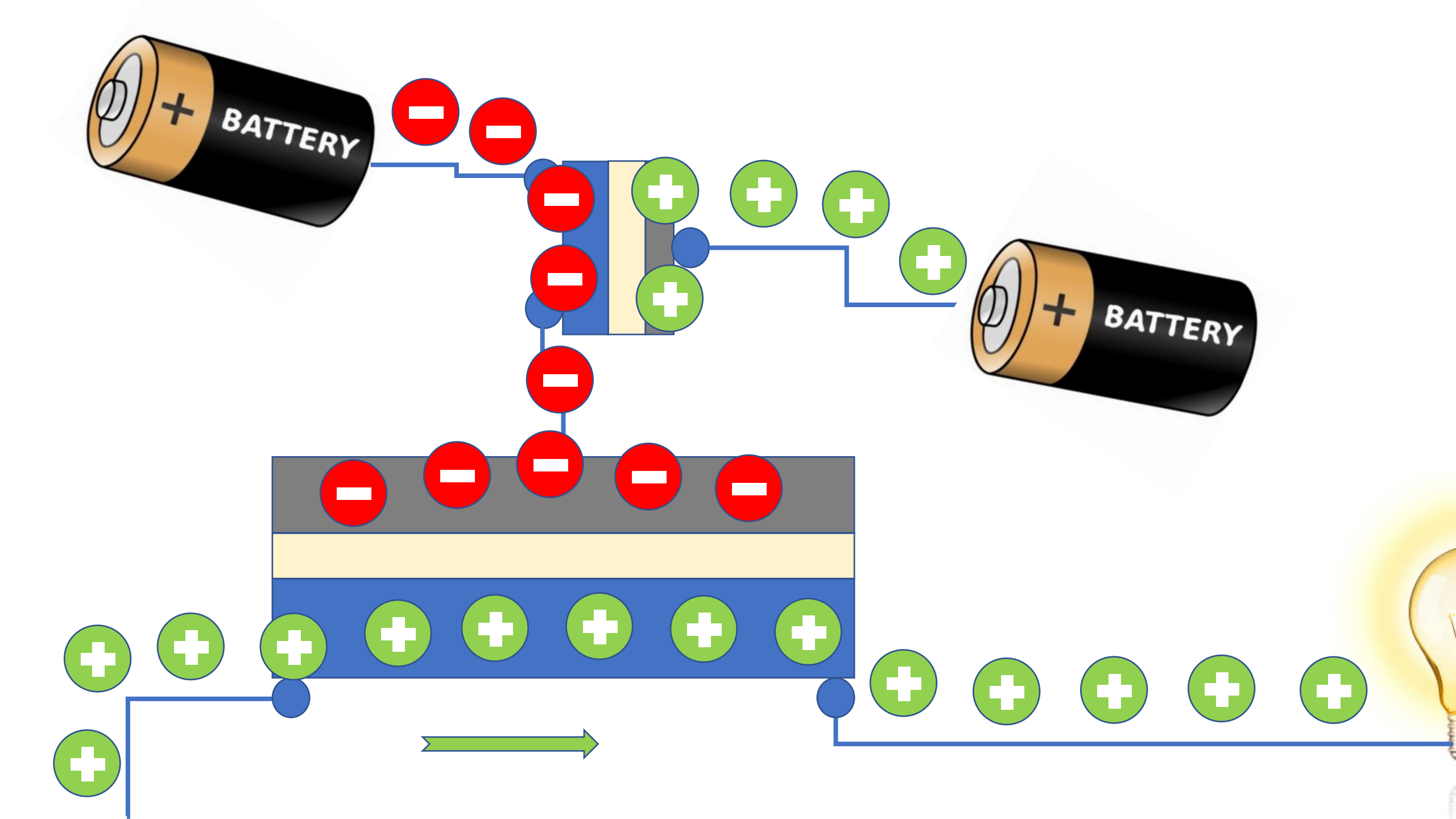
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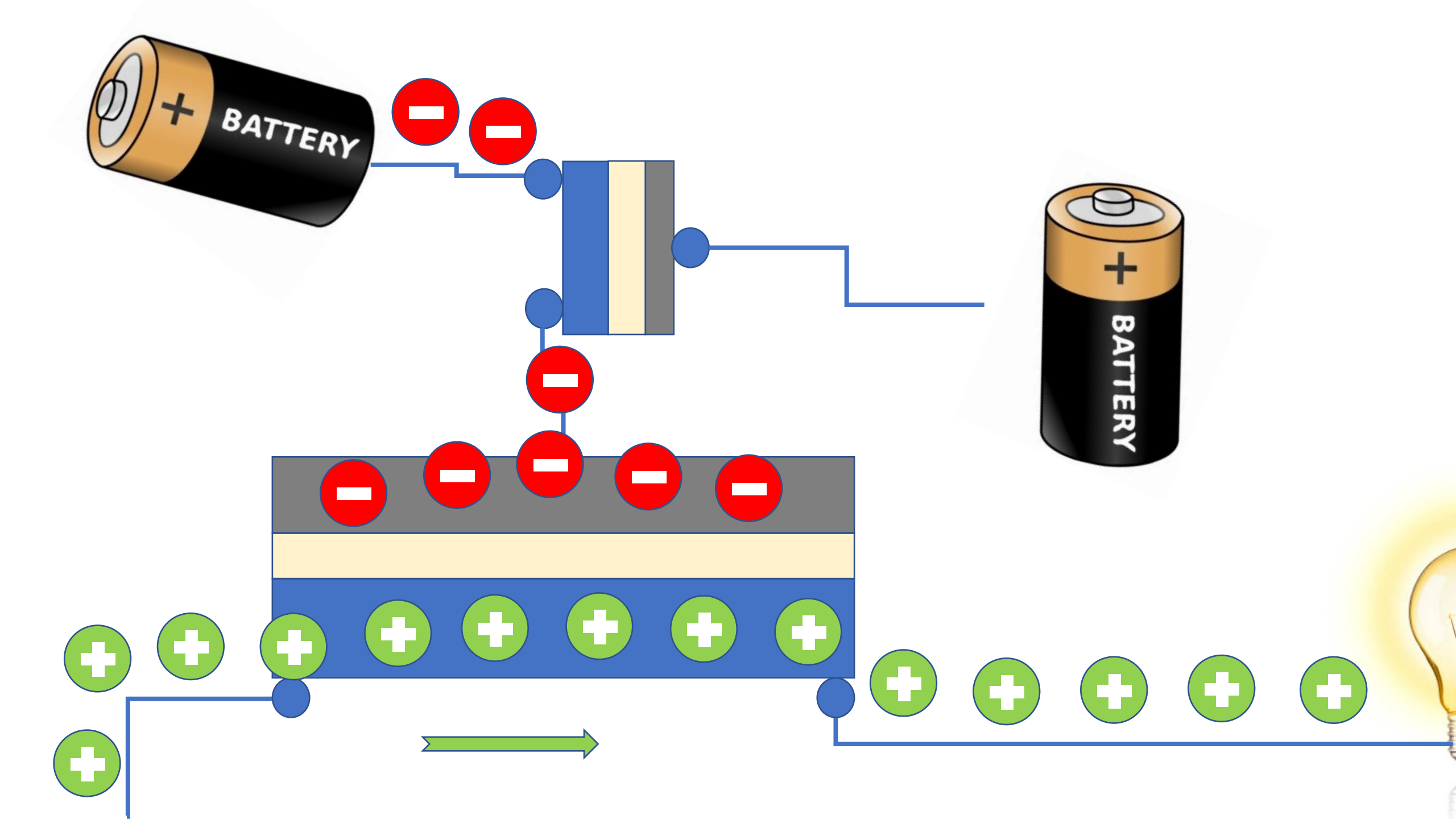
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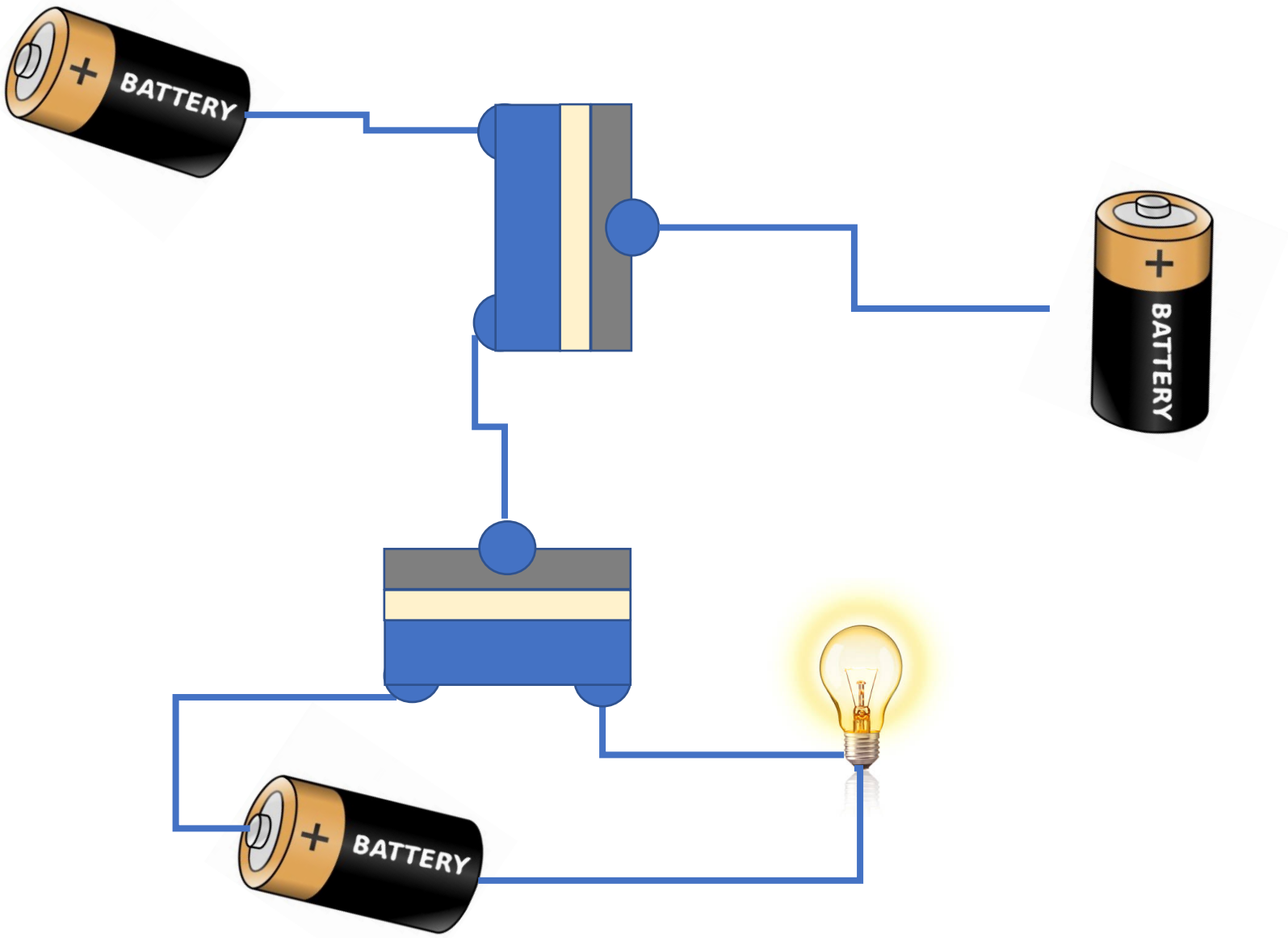
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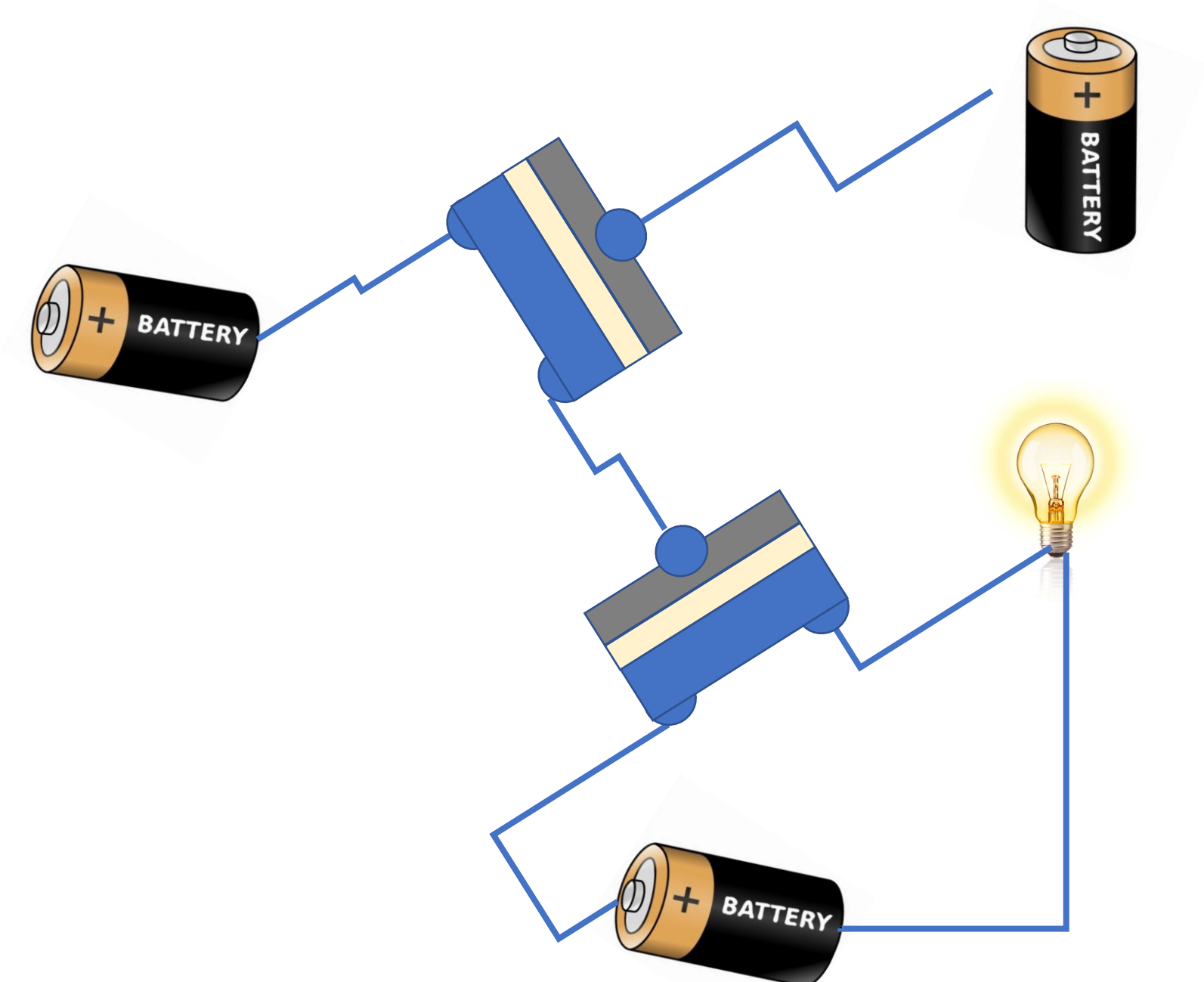
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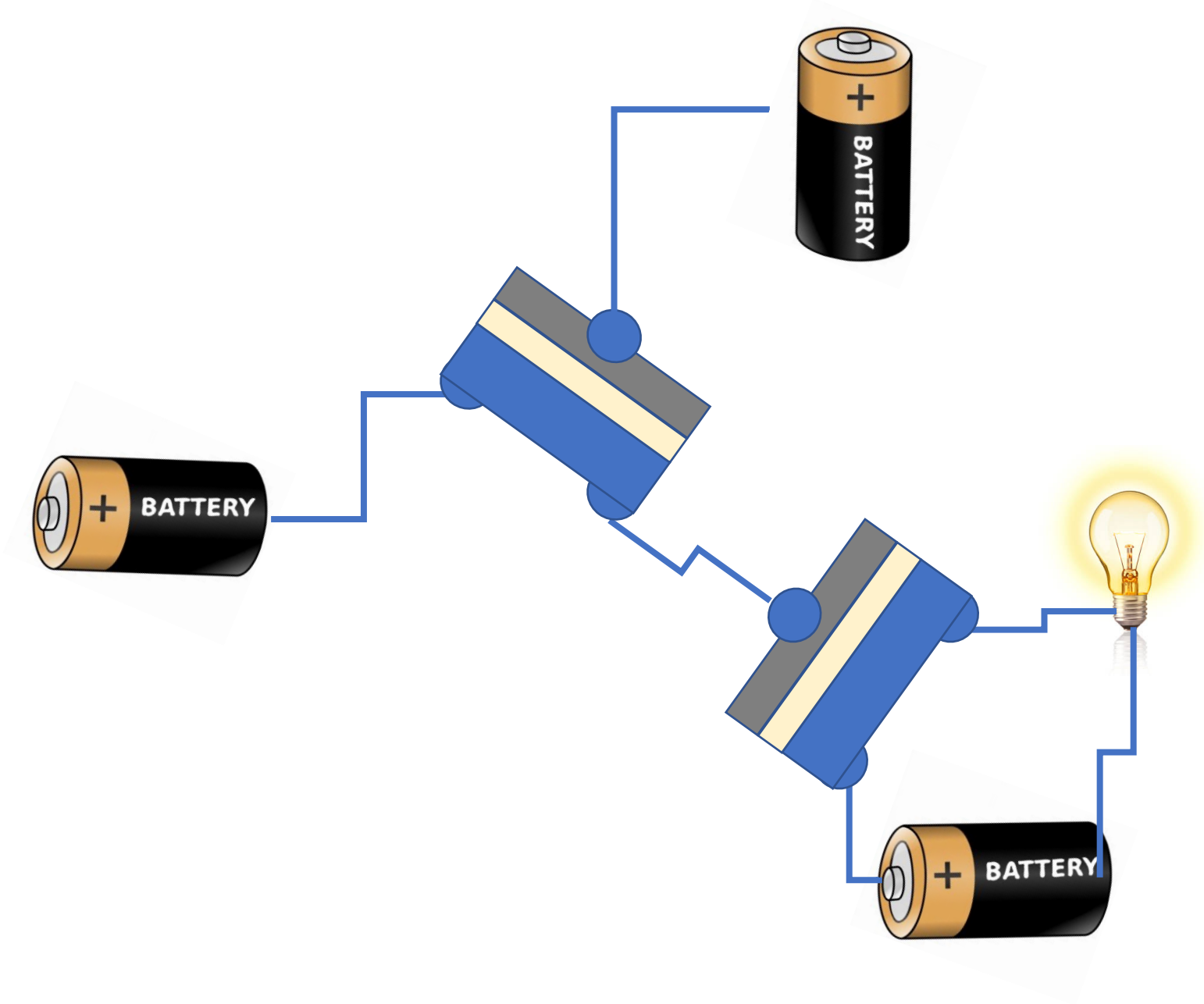
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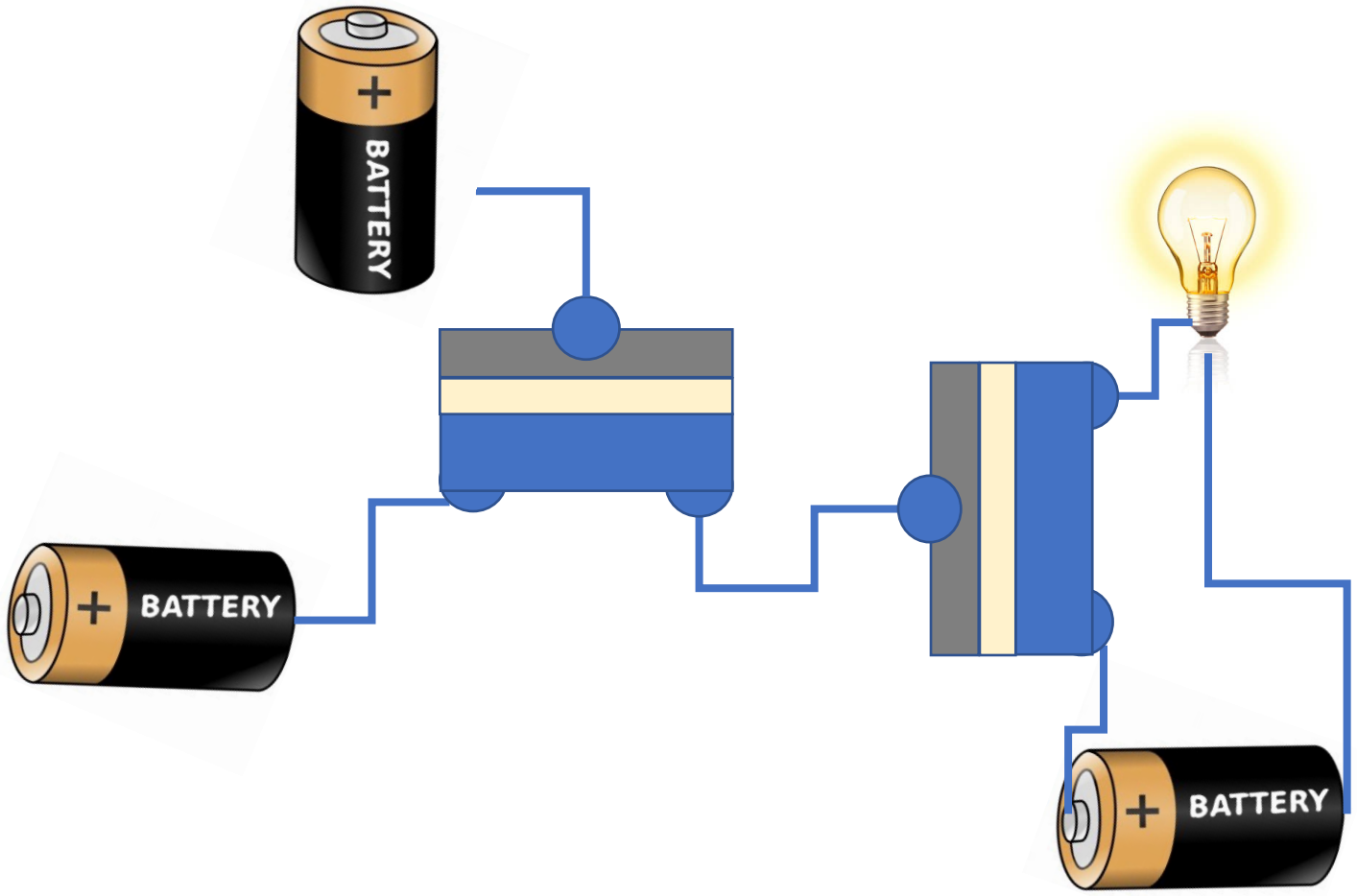
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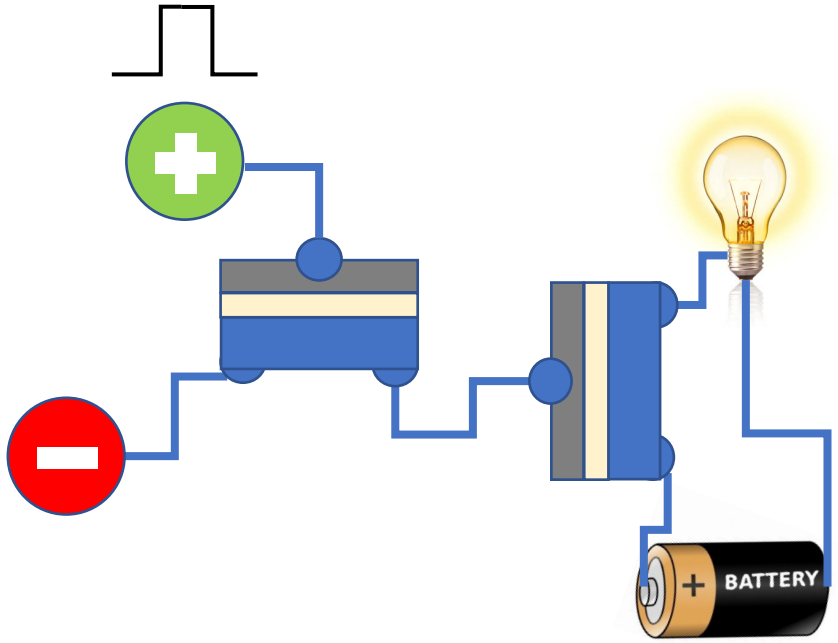
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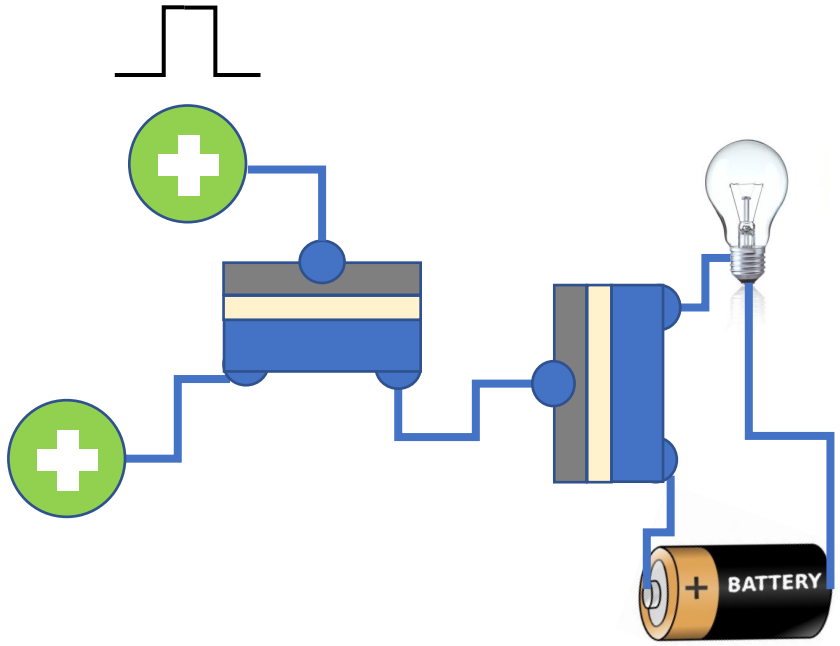
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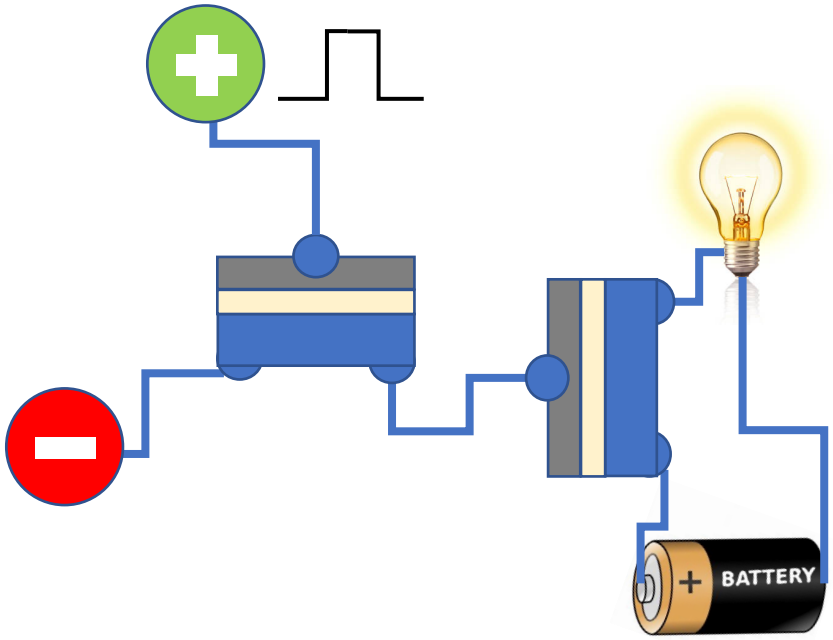
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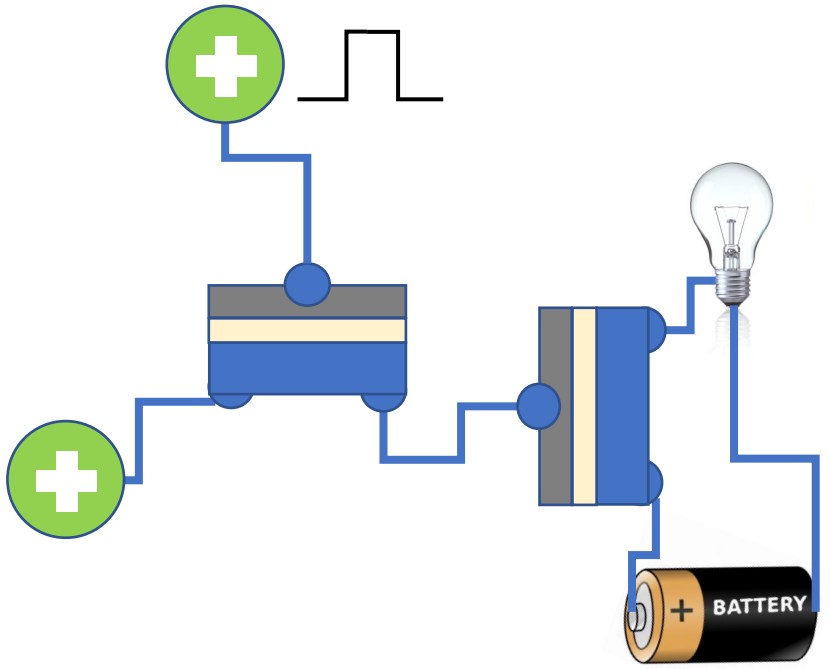
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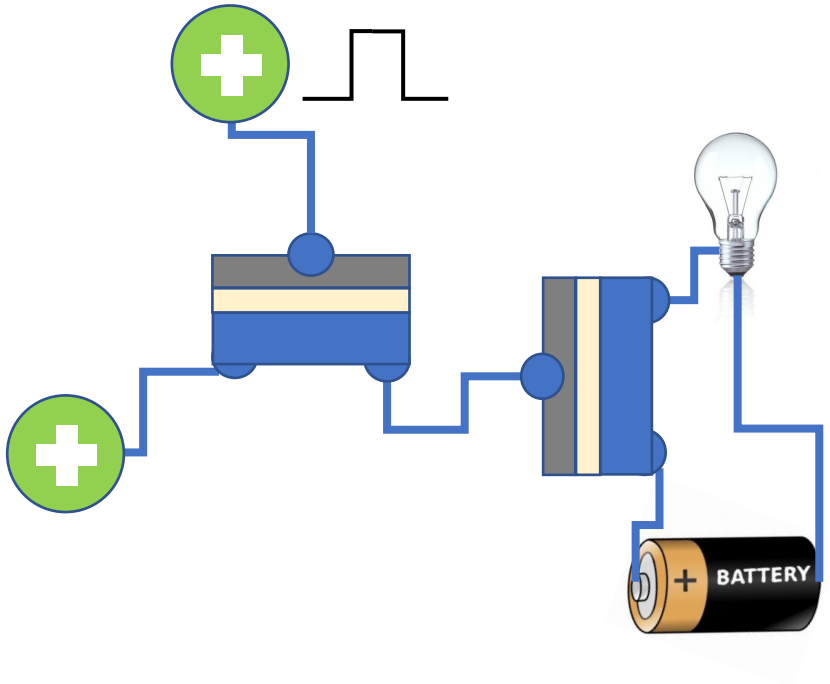
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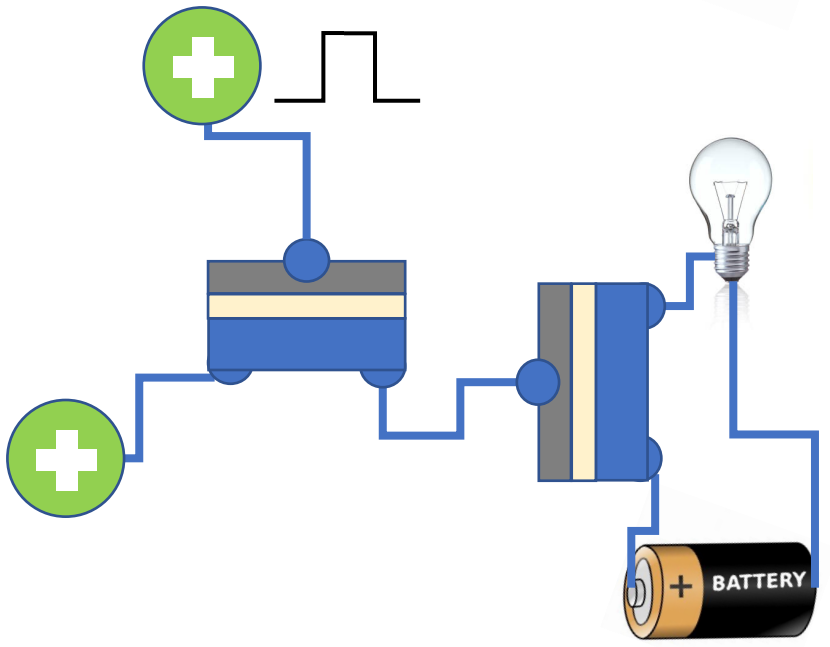
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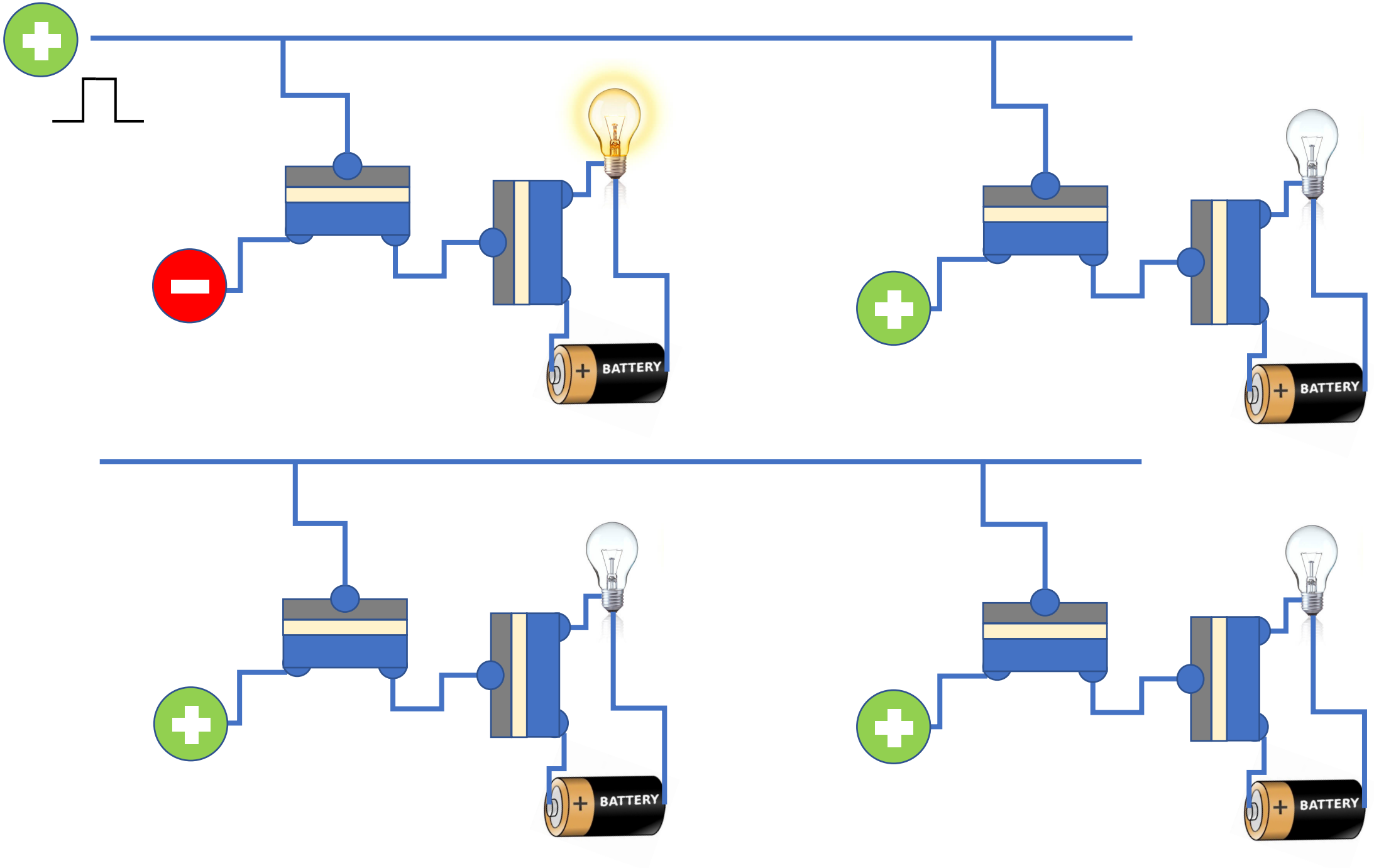
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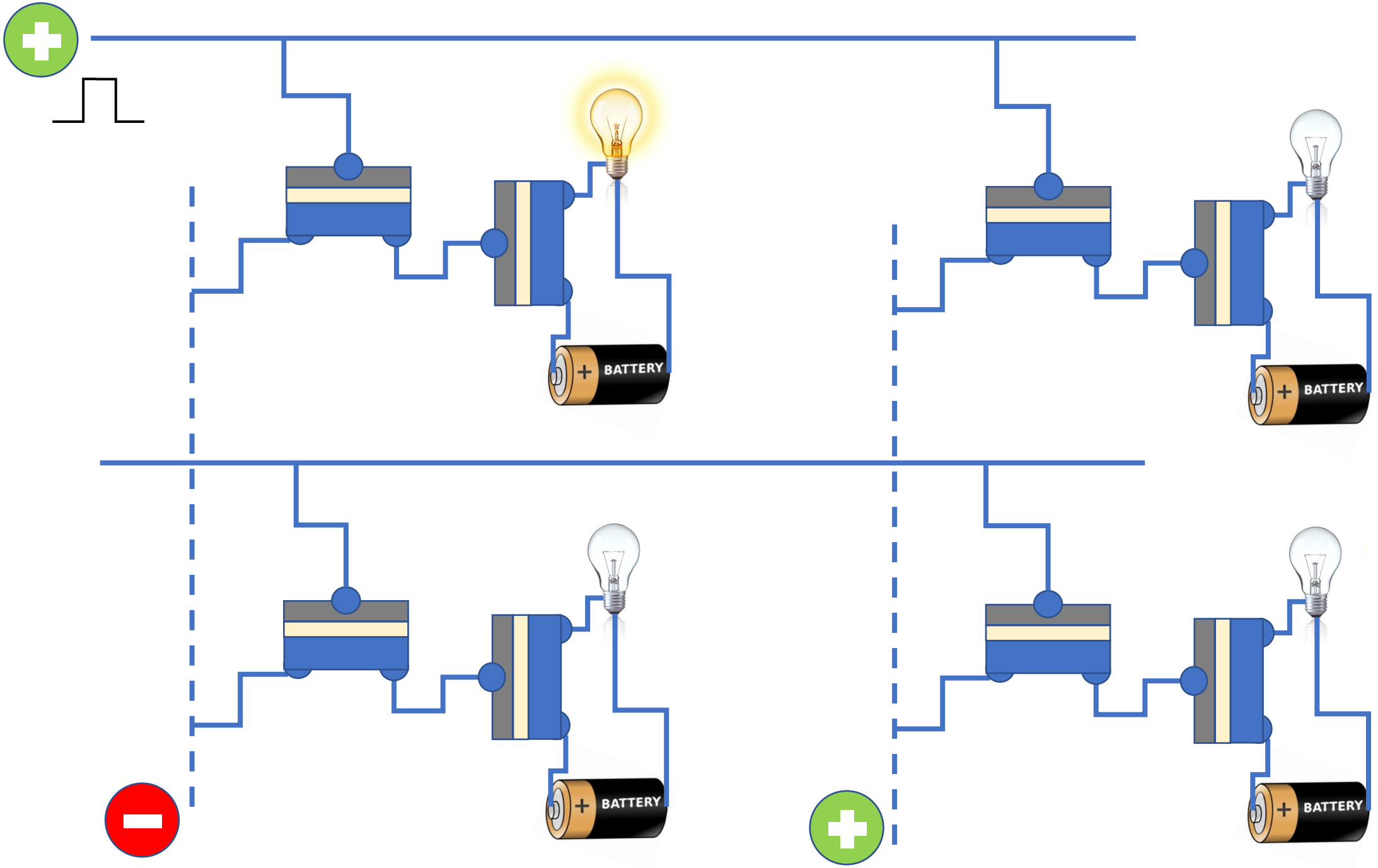
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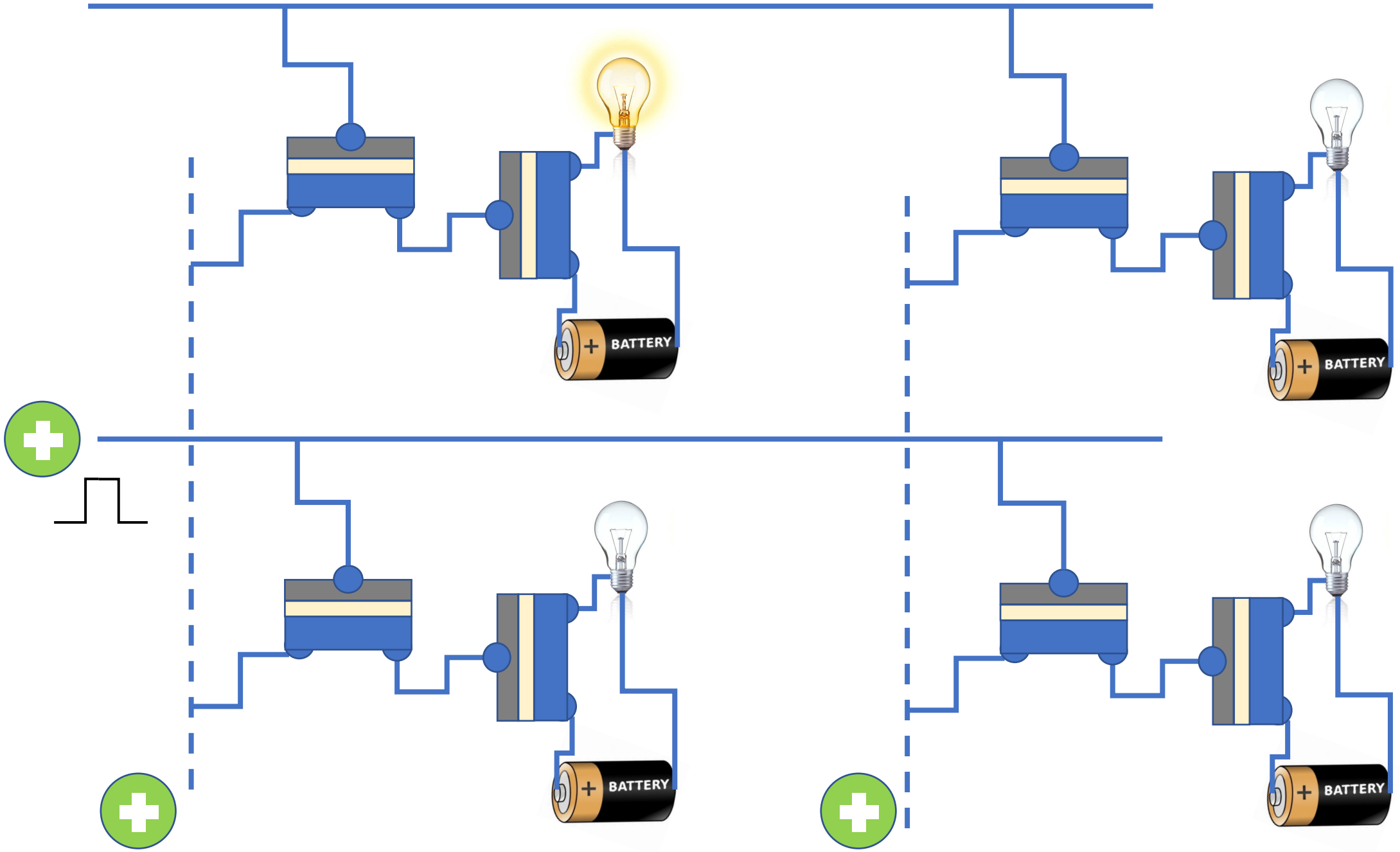
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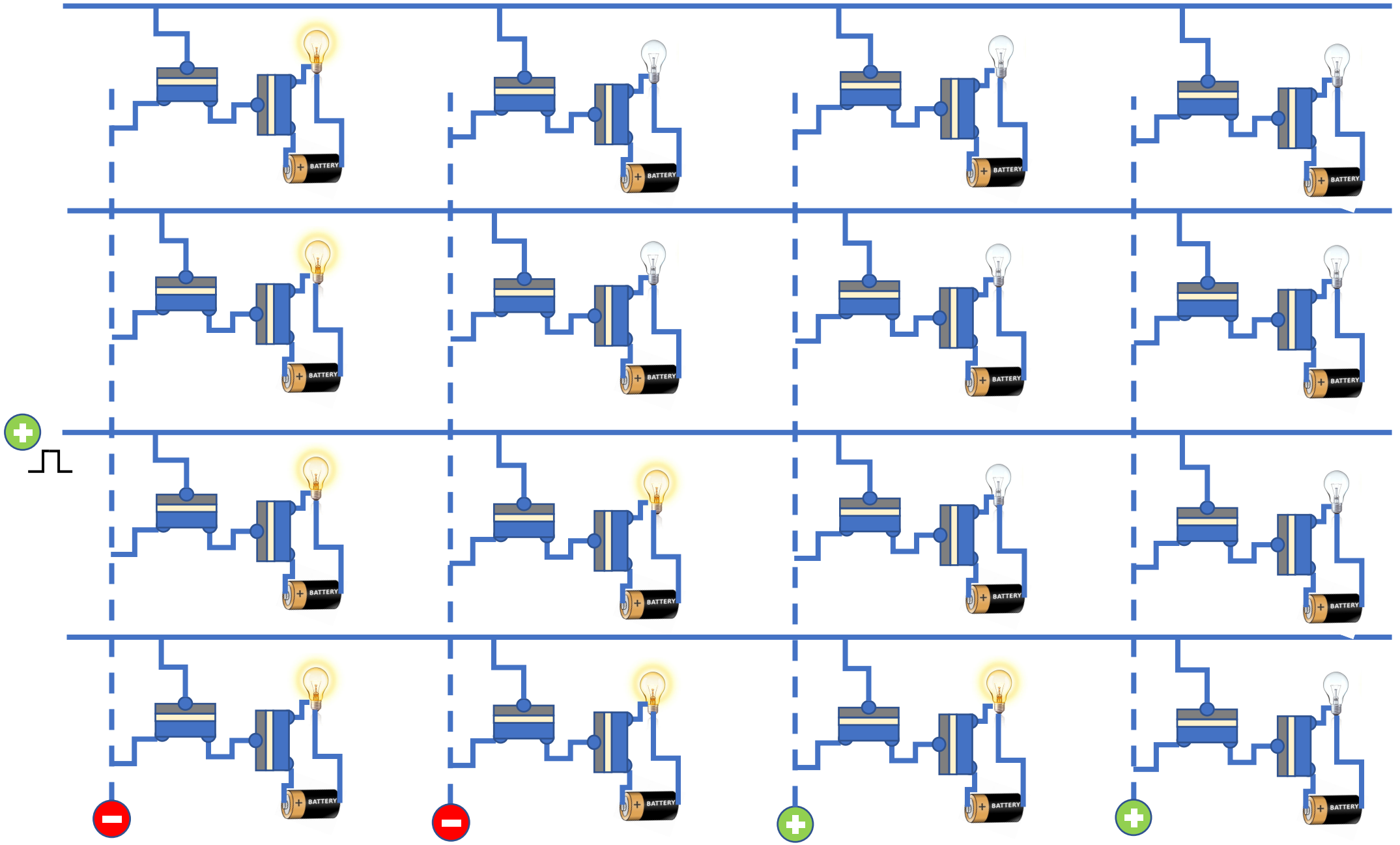
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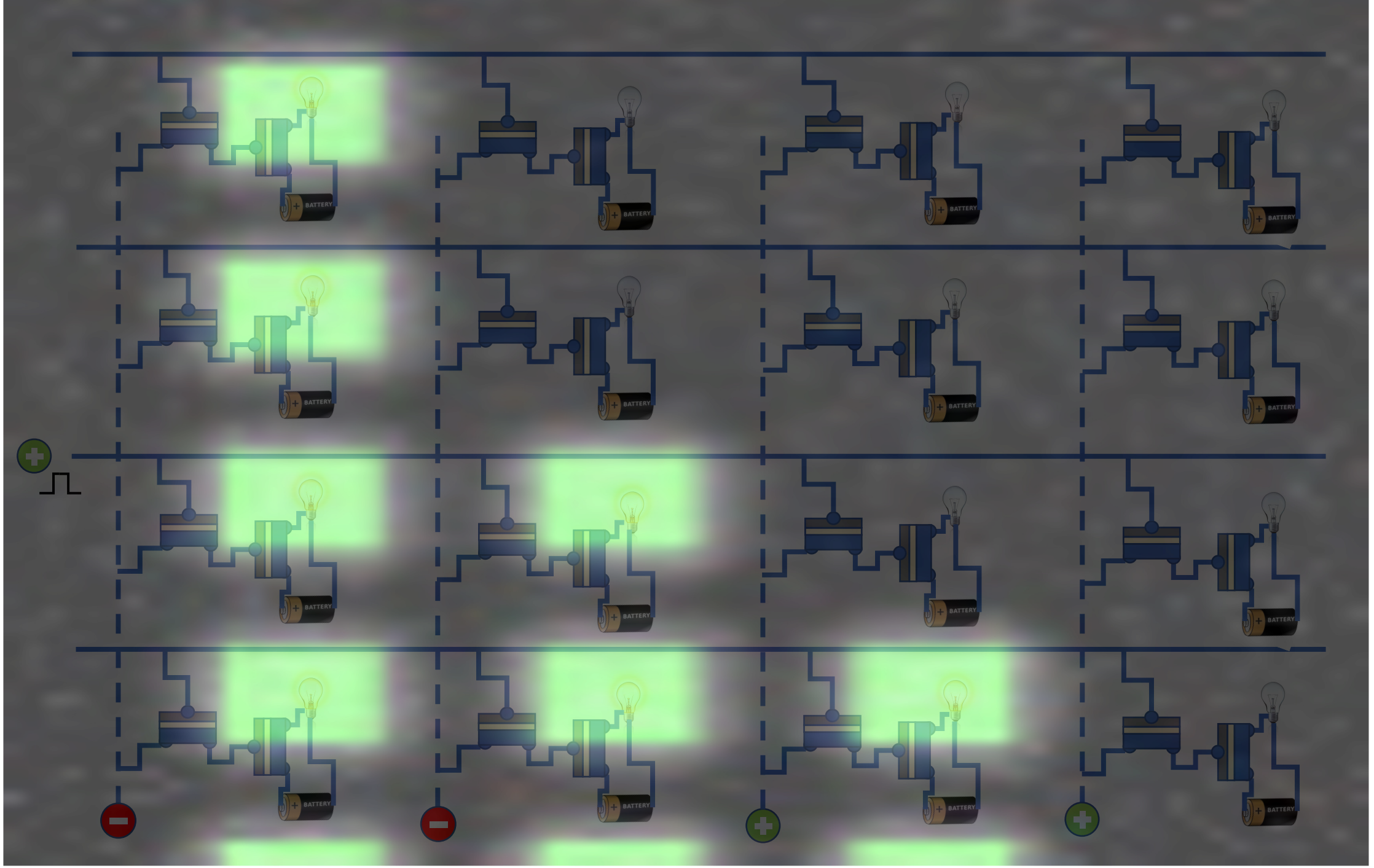
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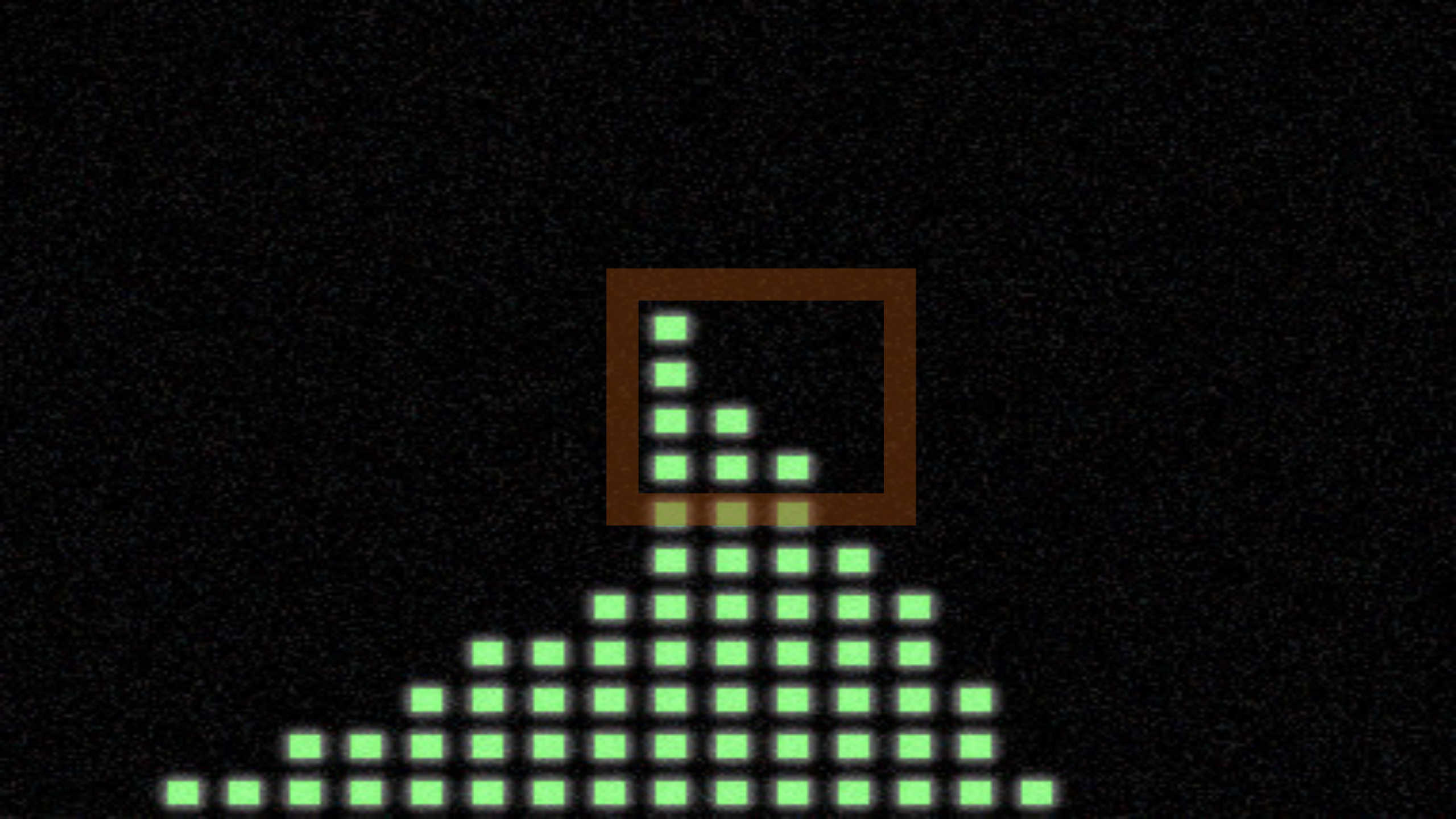
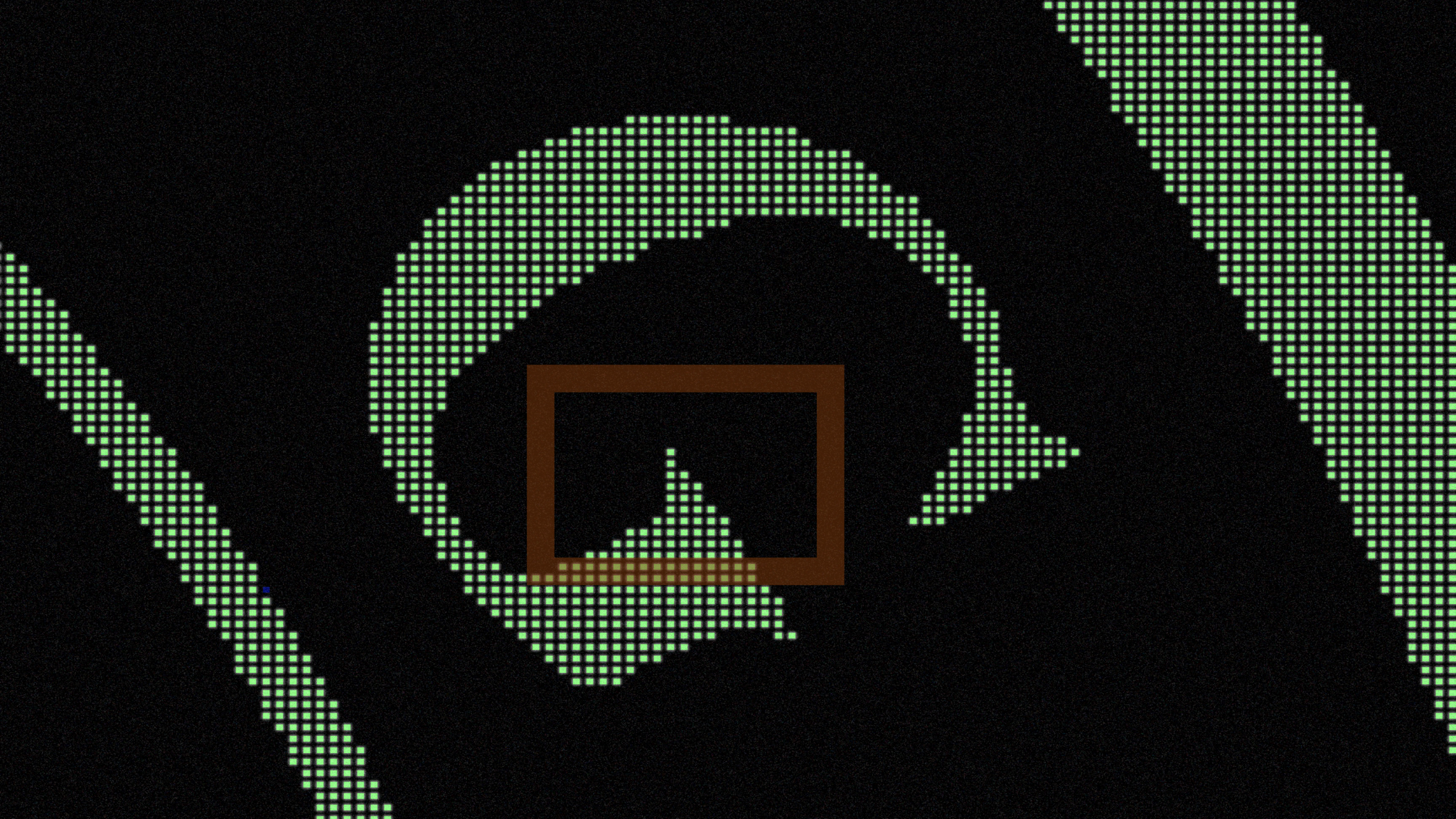
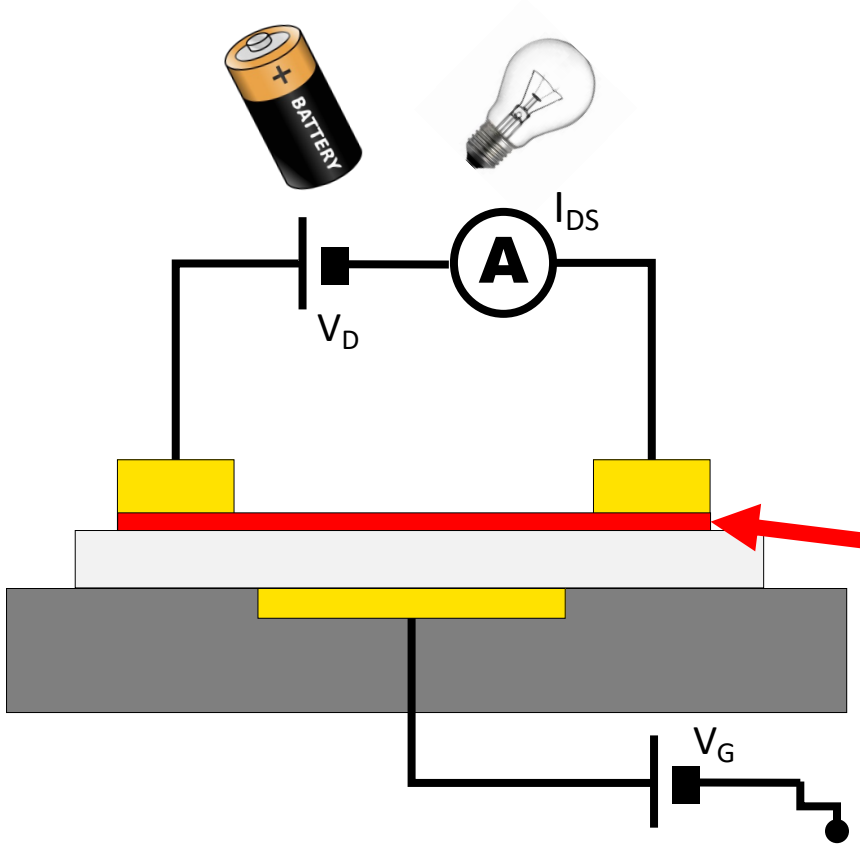


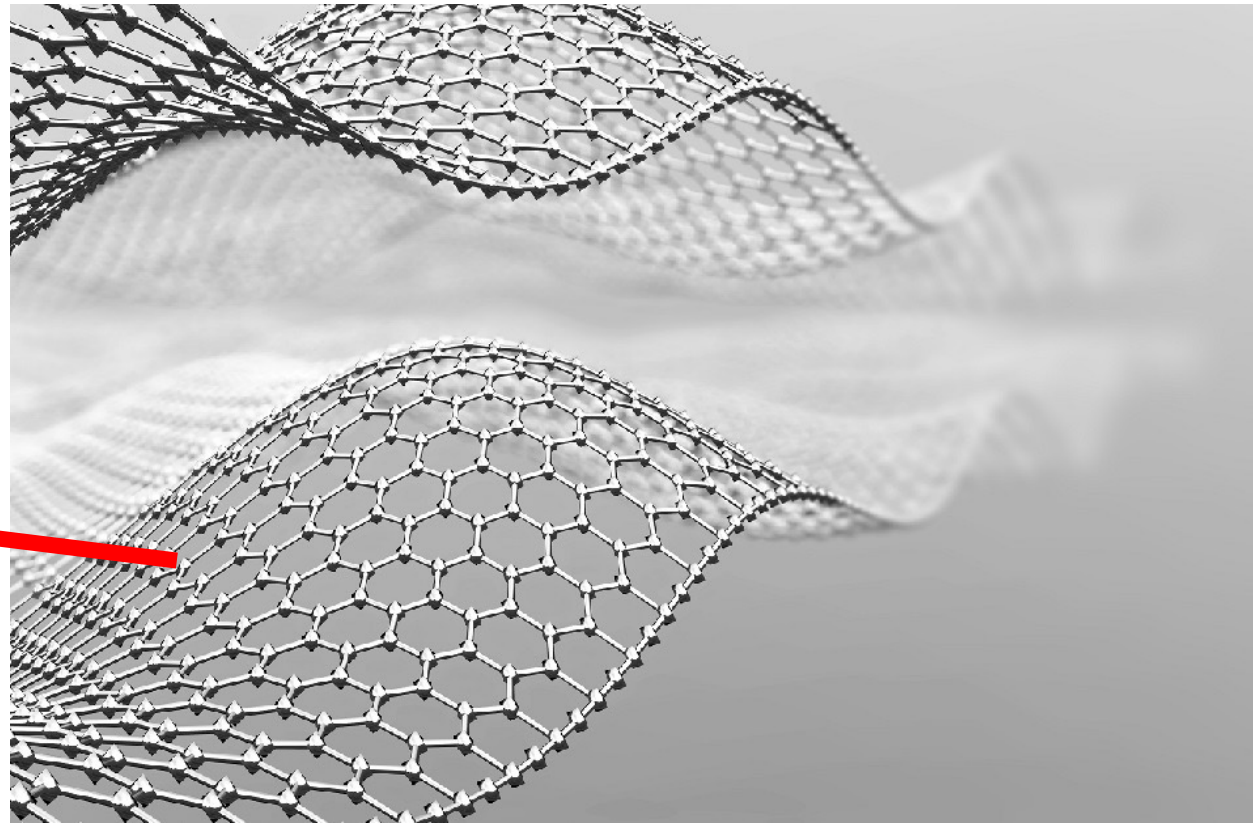



UNIVERZITA KOMENSKÉHO

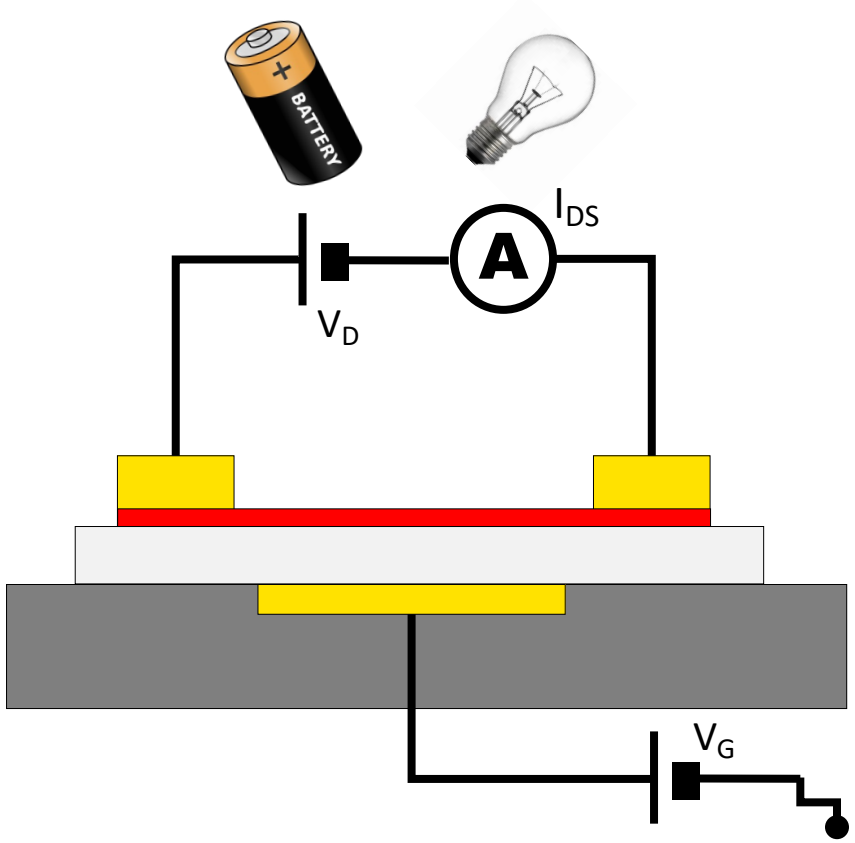

4G LTE
100%
12:45
UNIVERZA V NOVI GORICI
SCIENTIA 1995 VINCES

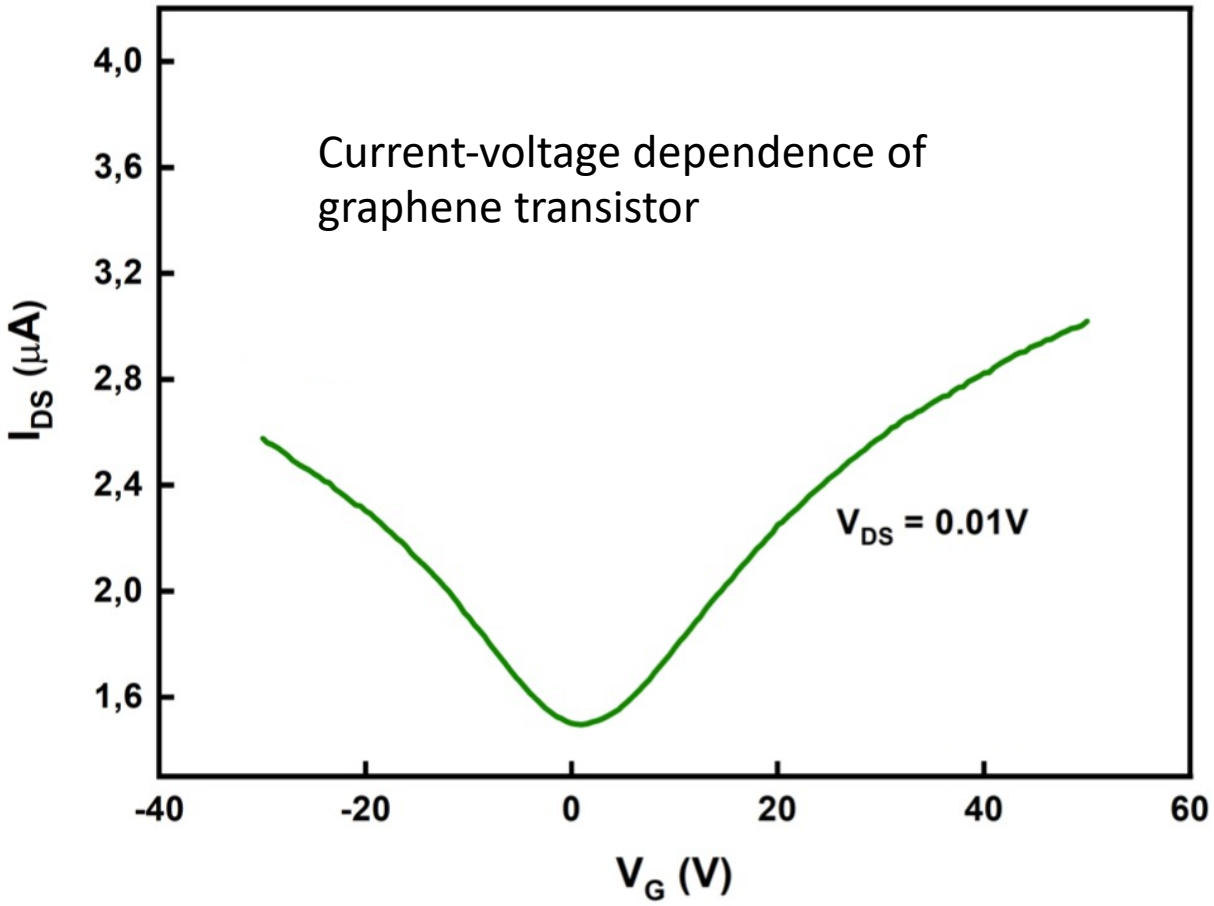
Graphene transistor





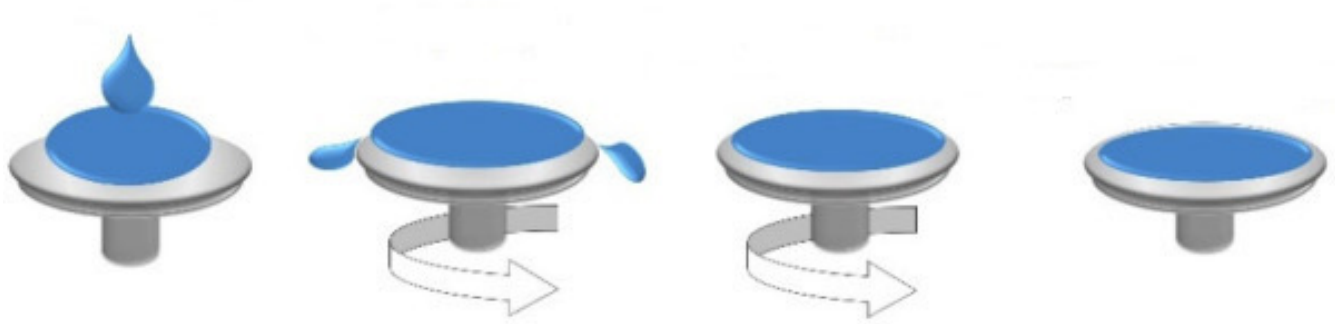
Graphene transistor





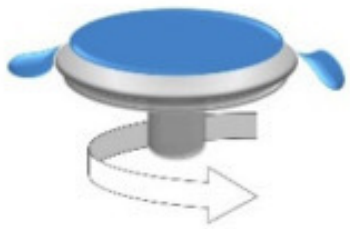
V. Tkachuk et al, Org. Elect. 87, 105933 (2020).

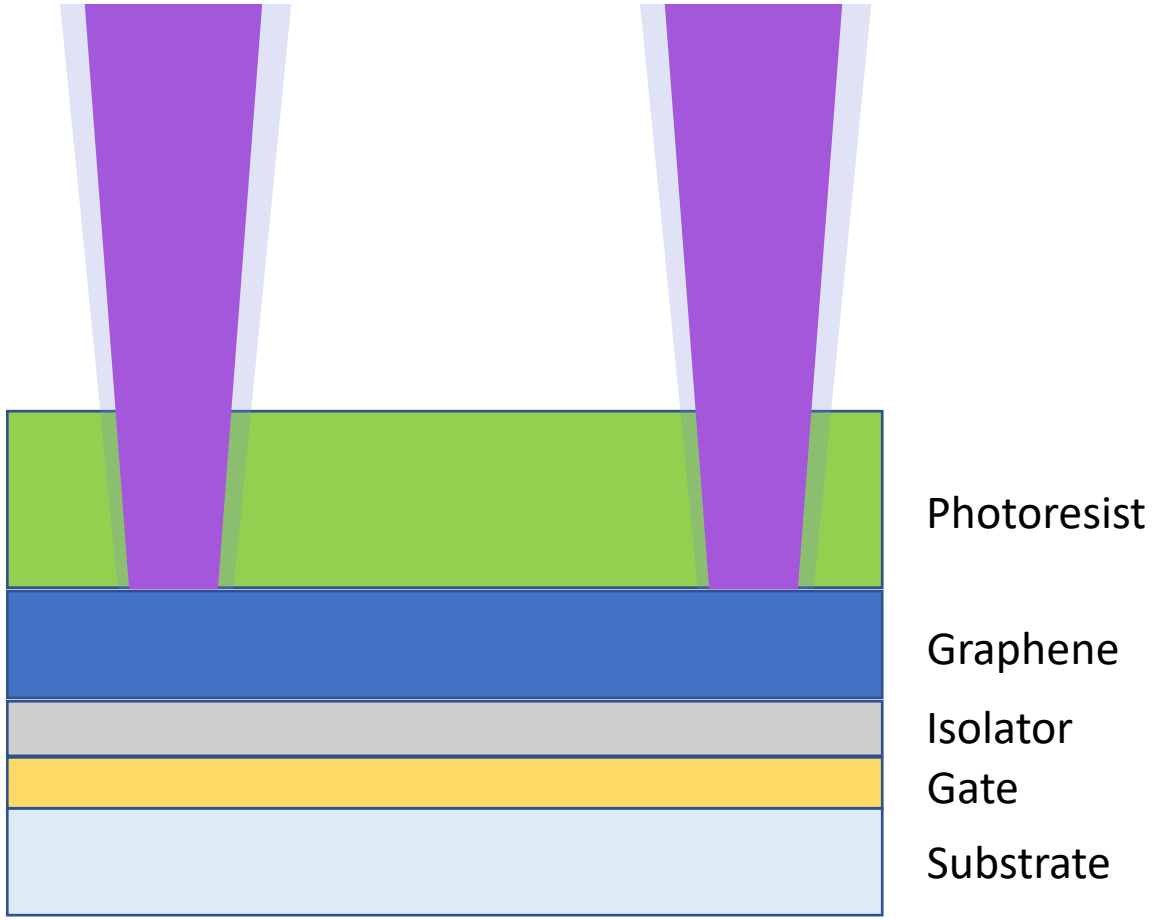
Spin-coating method



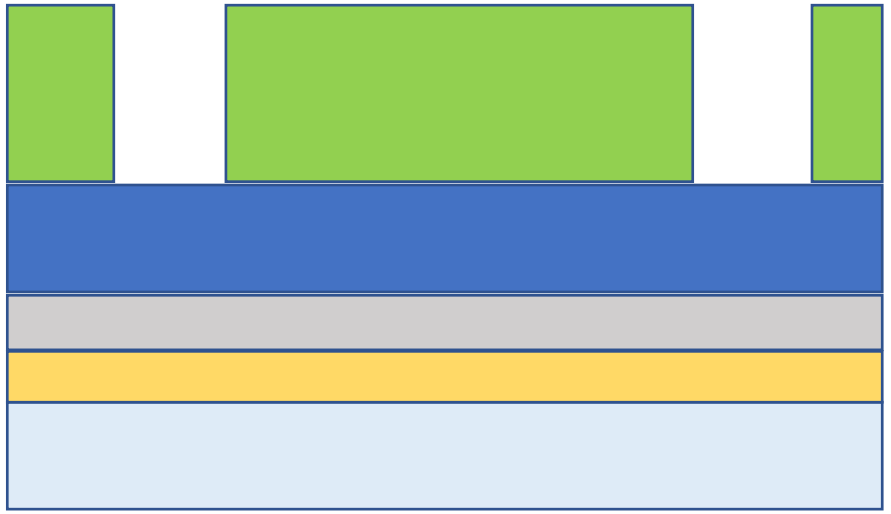

MODEL WS-650MZ-23NPP
MOVING PARTS
WARNING
Keep hands away from chamber area while in operation.
WARNING
CHEMICAL SPLASH HAZARD.
WARNING
F1
F2
RUN MODE
EDIT MODE
INFO
START
STOP
PAUSE
REV
FWD

Lithography 1st step

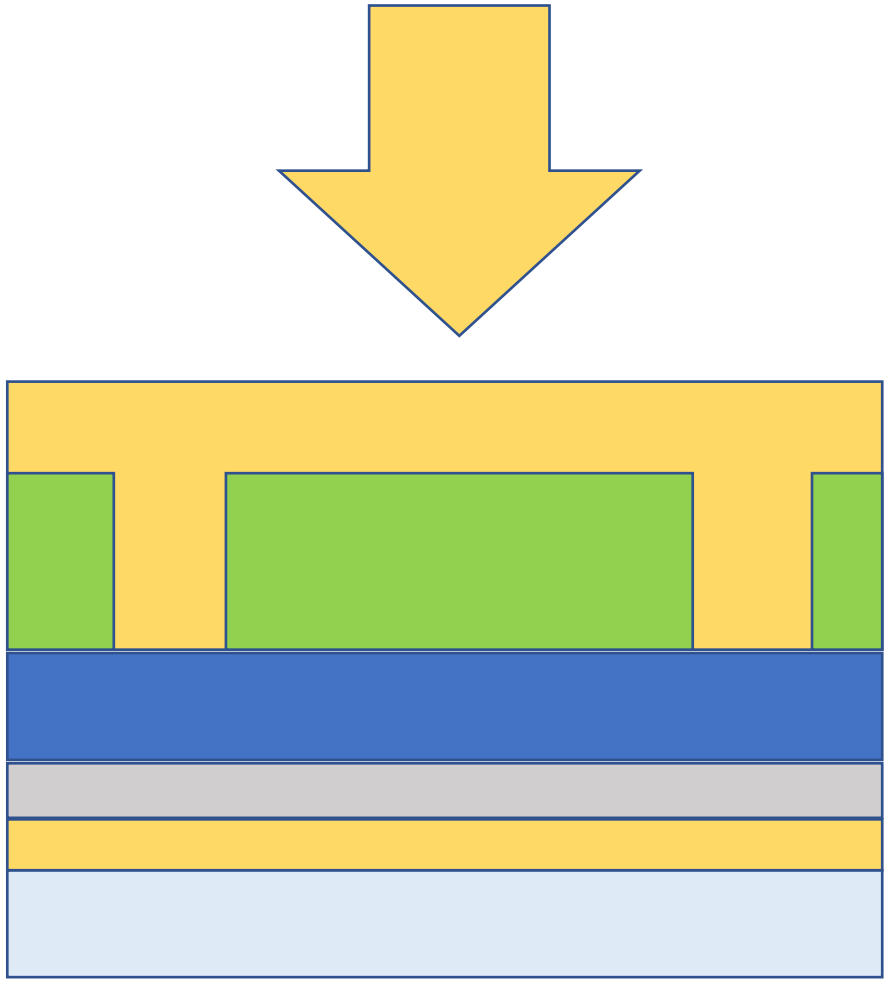




Lithography 2nd step



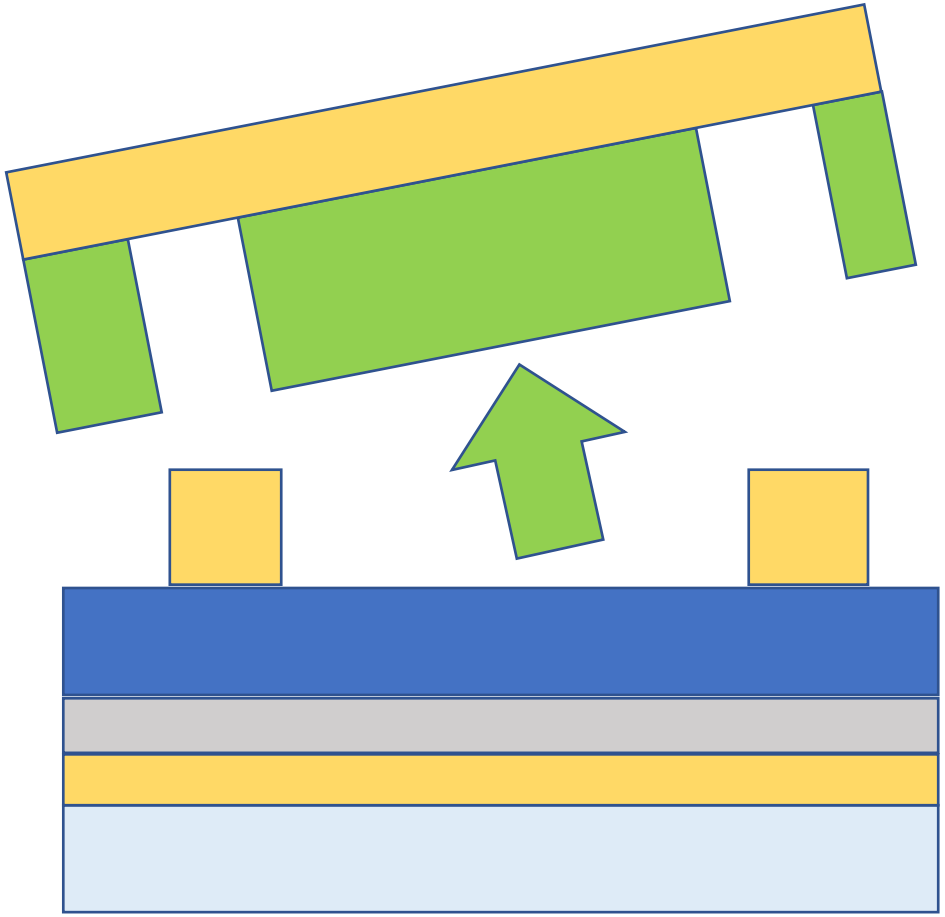
Lithography 3rd step



Evaporated gold

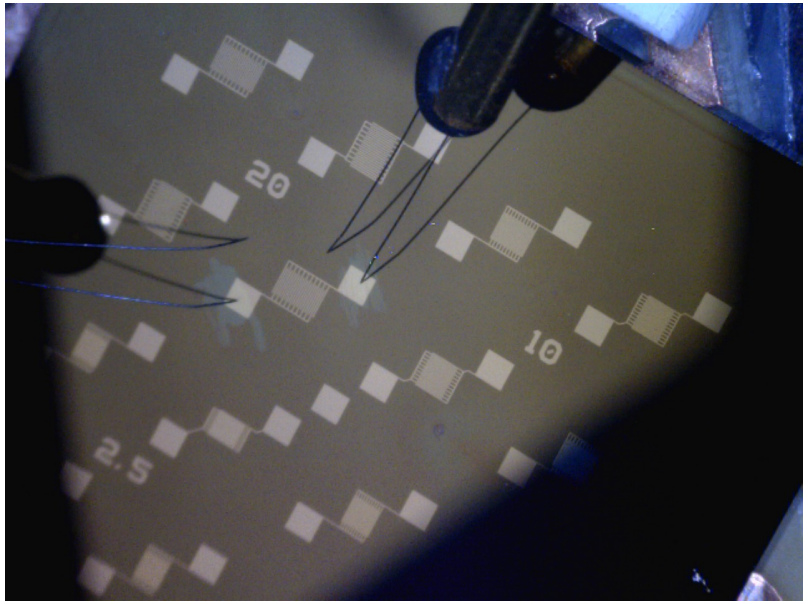
Photoresist

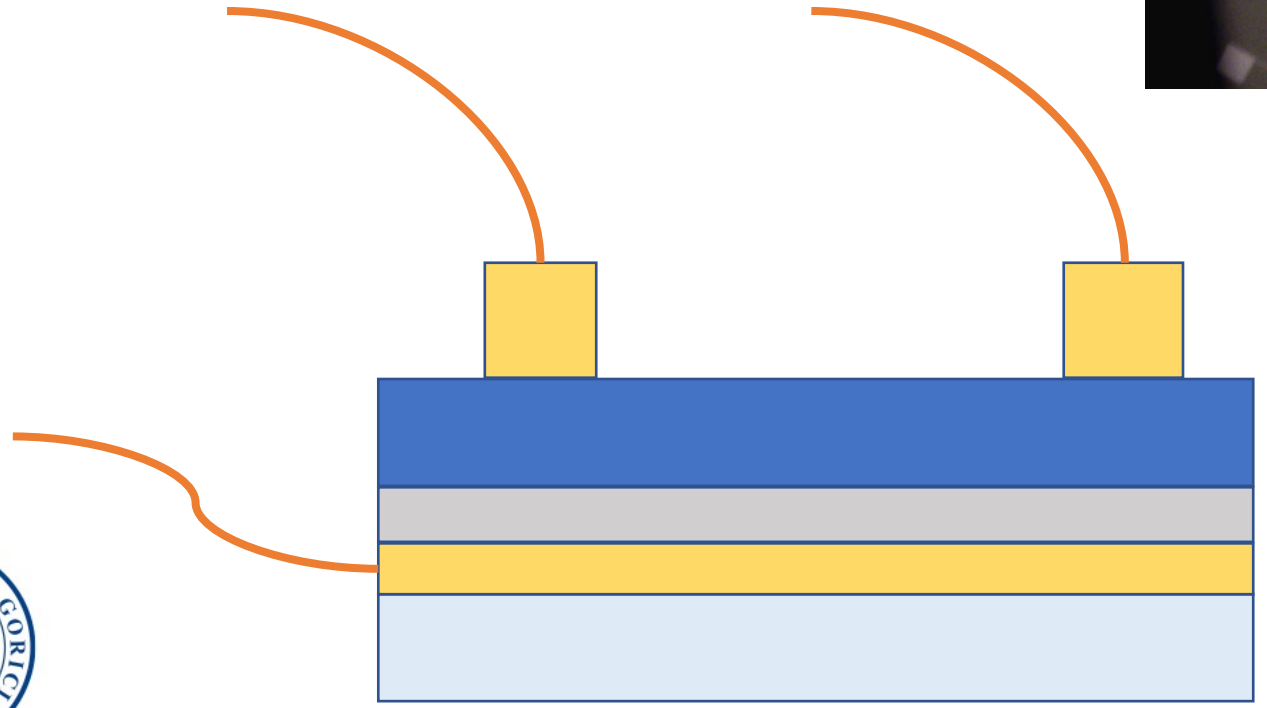
Lithography 4th step



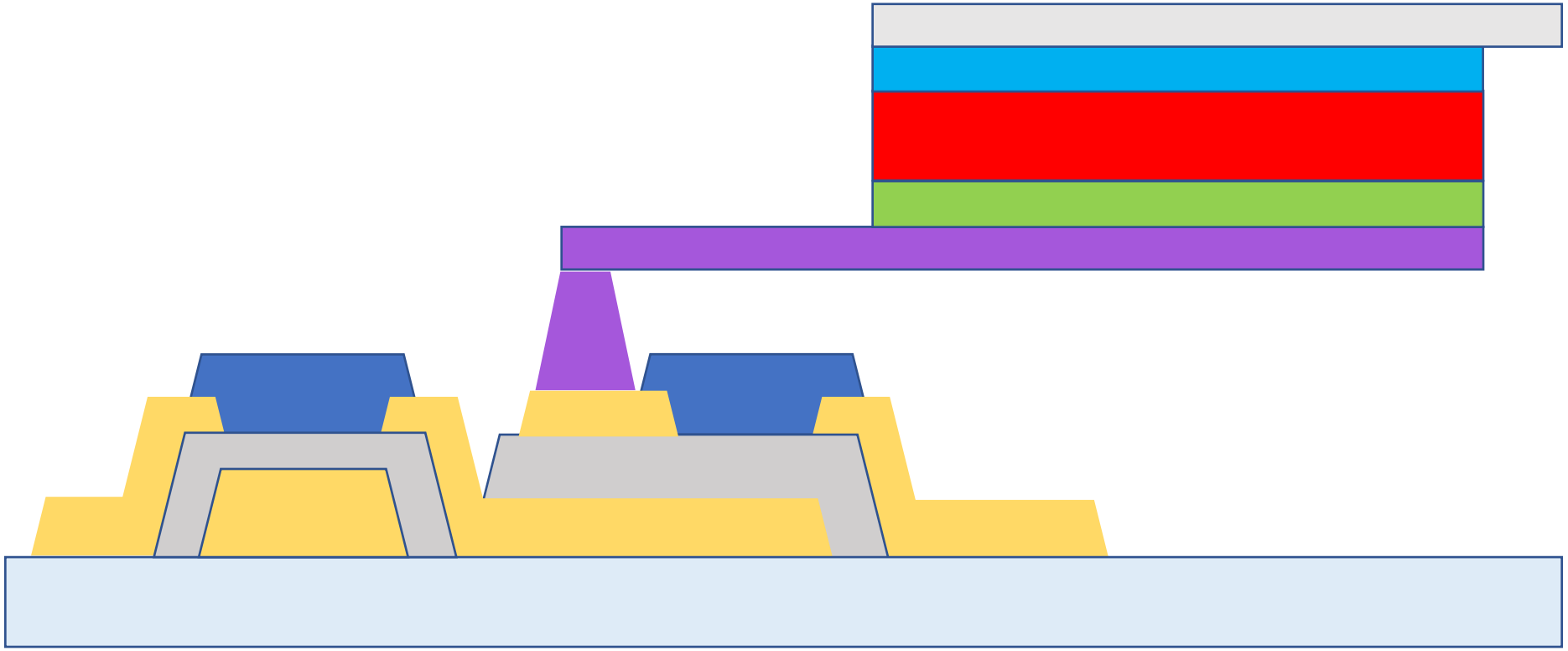
Photoresist

Transistor

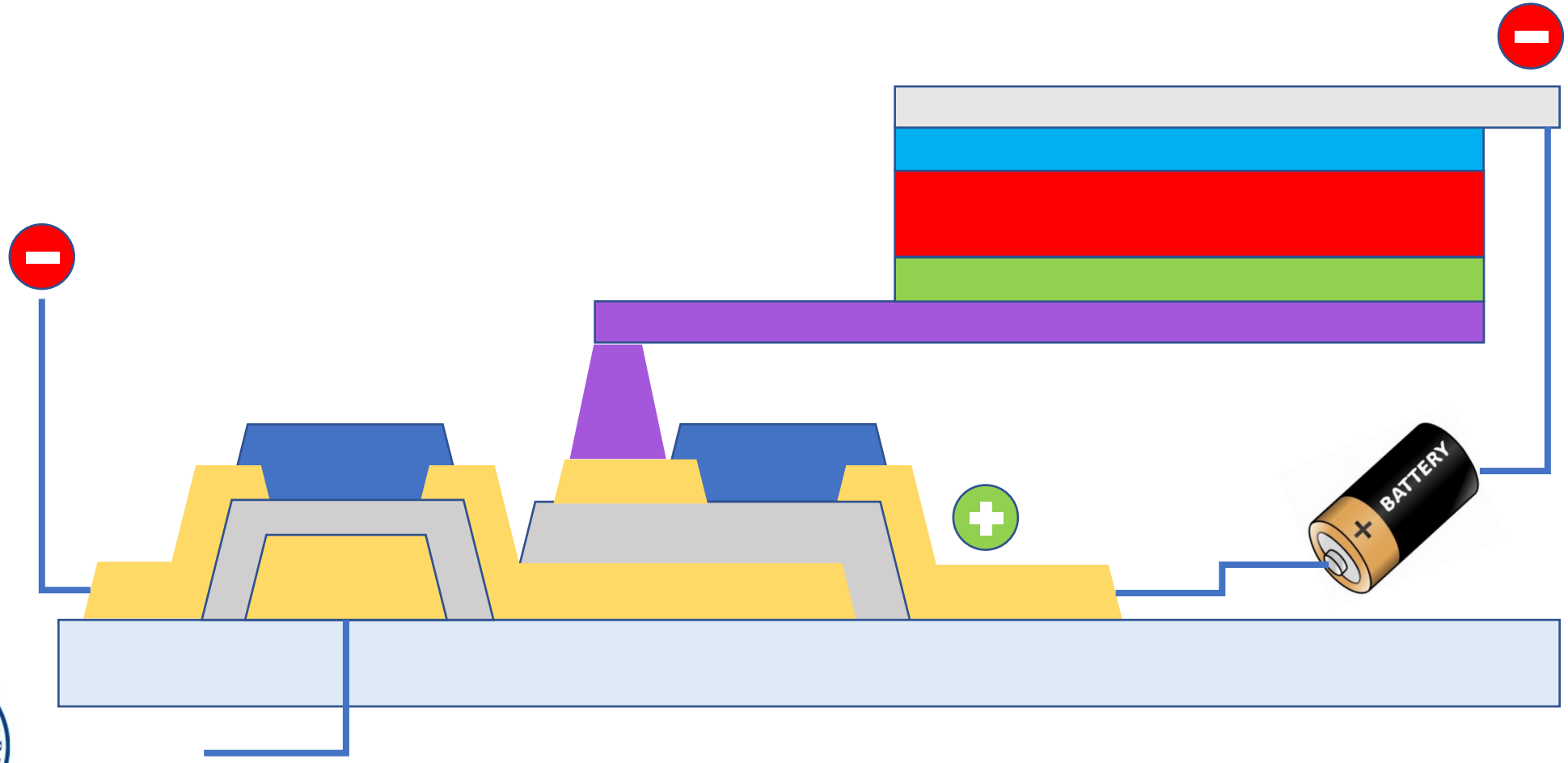




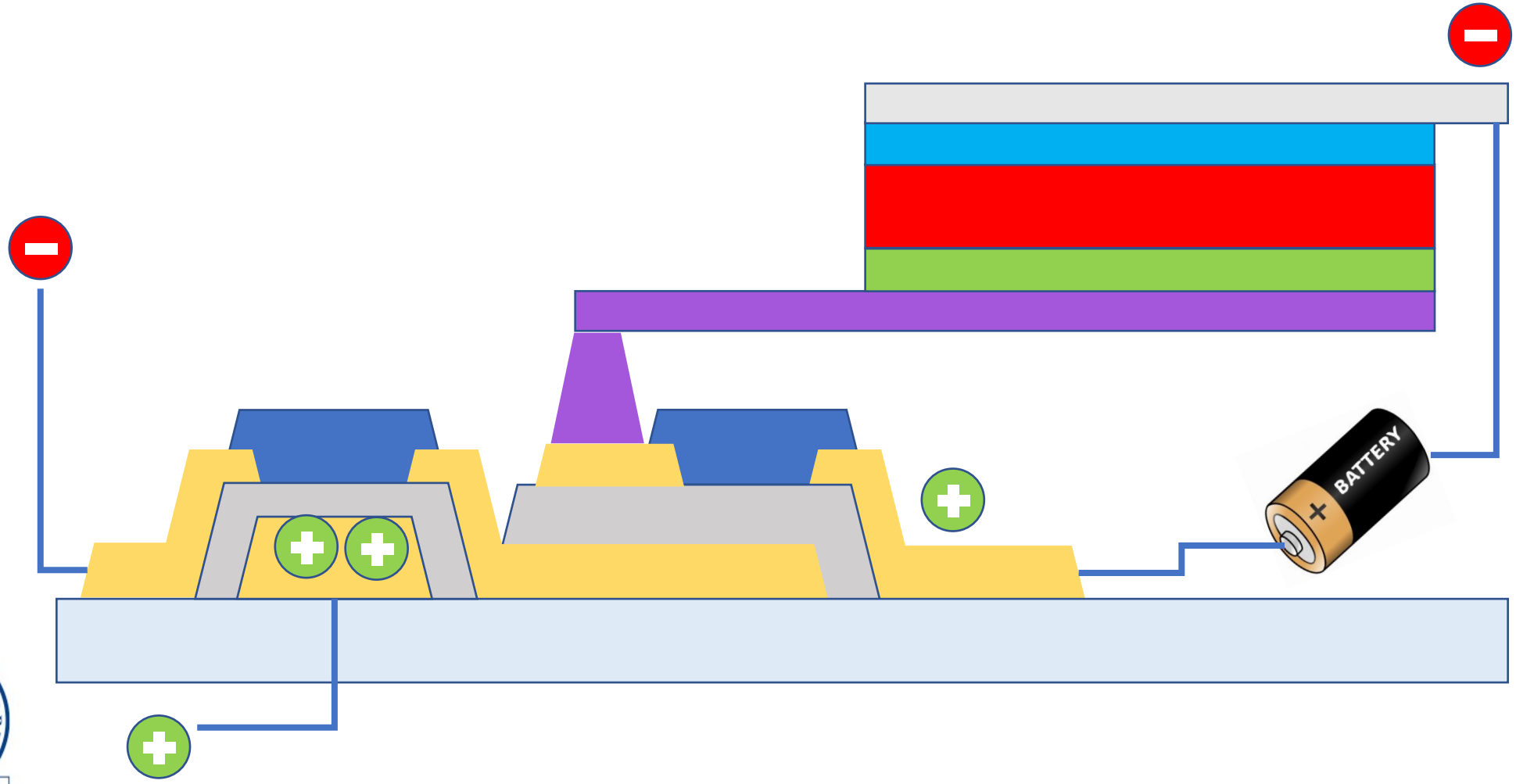
Two transistors and OLED



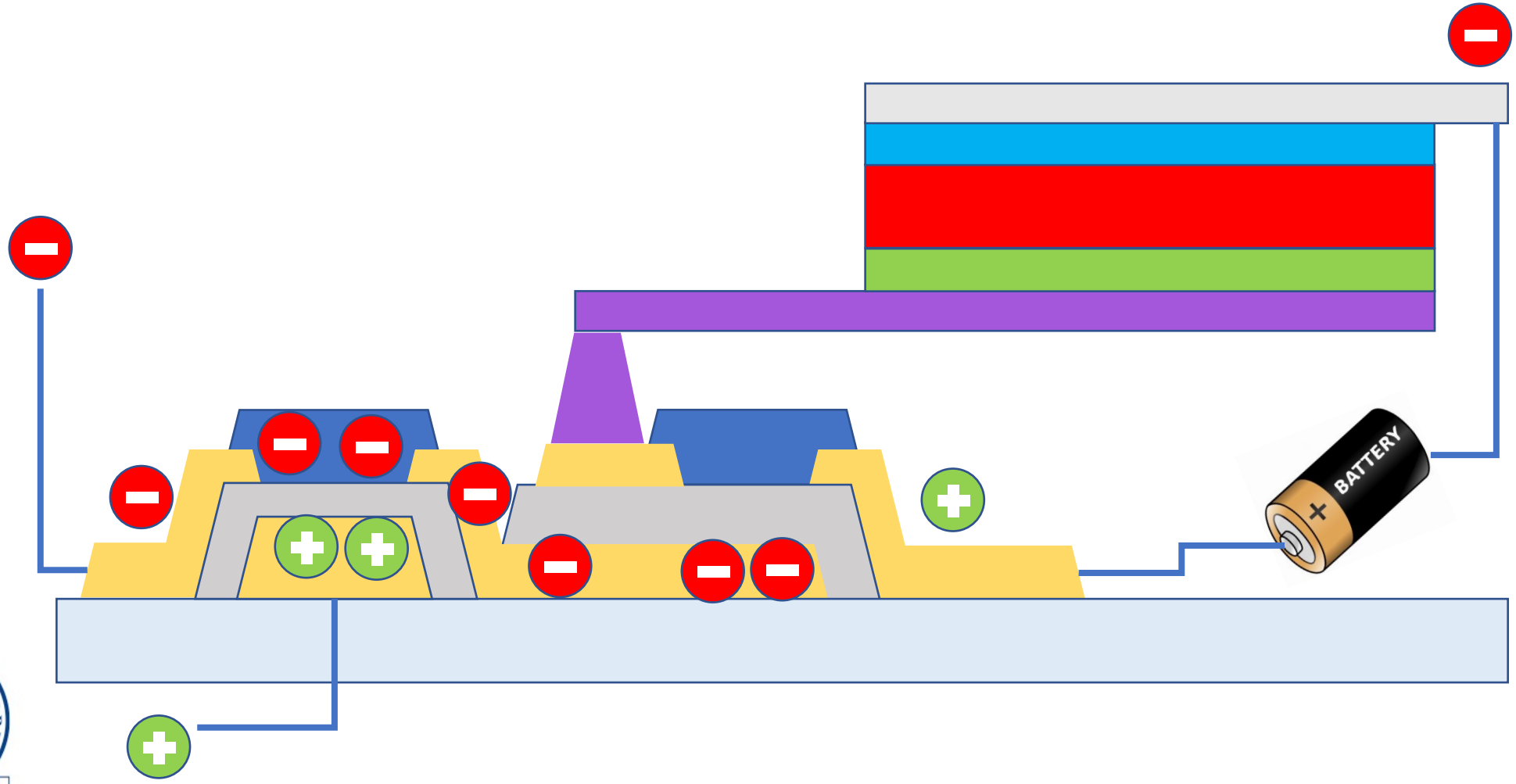
Two transistors and OLED



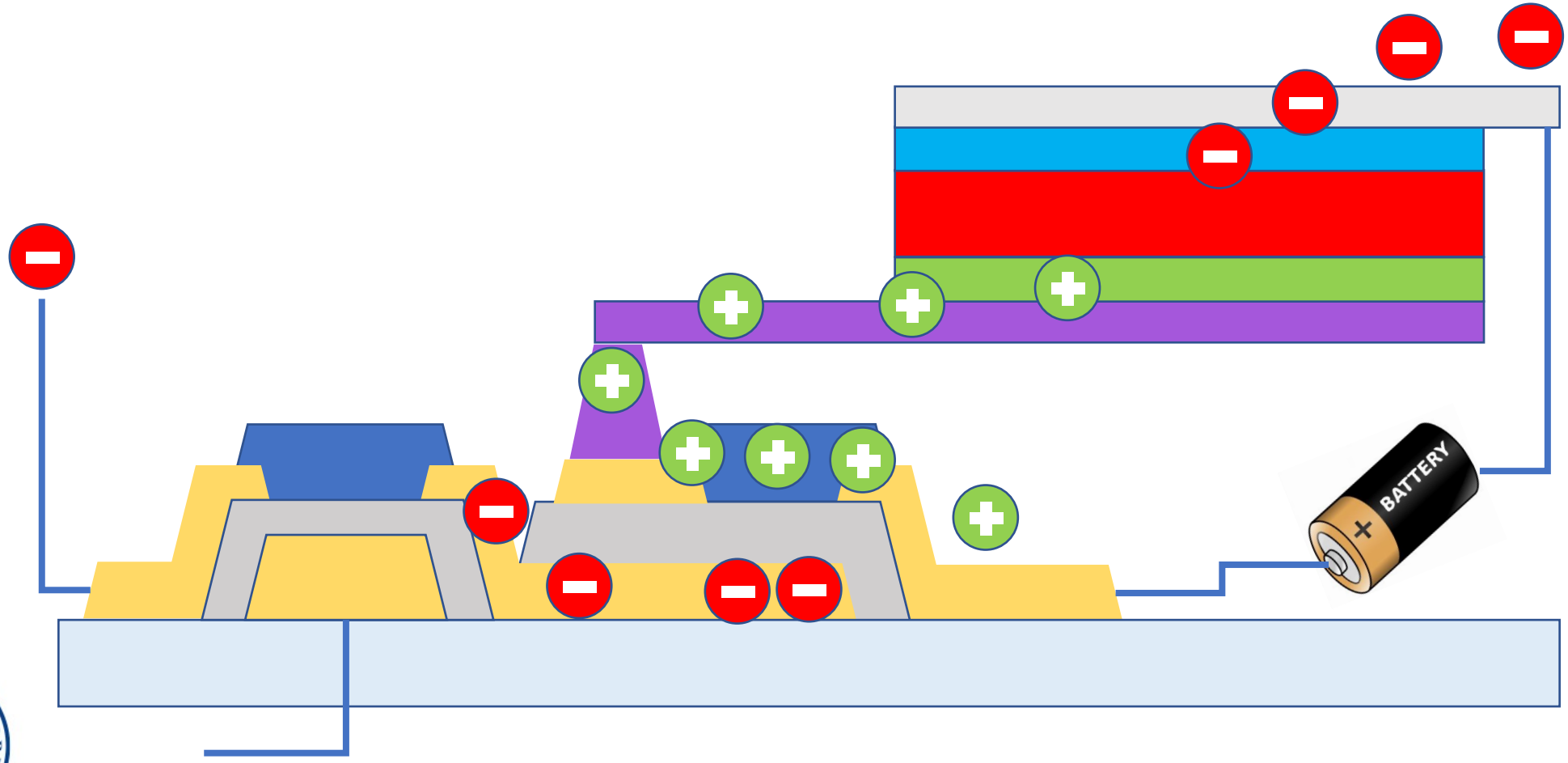
Two transistors and OLED



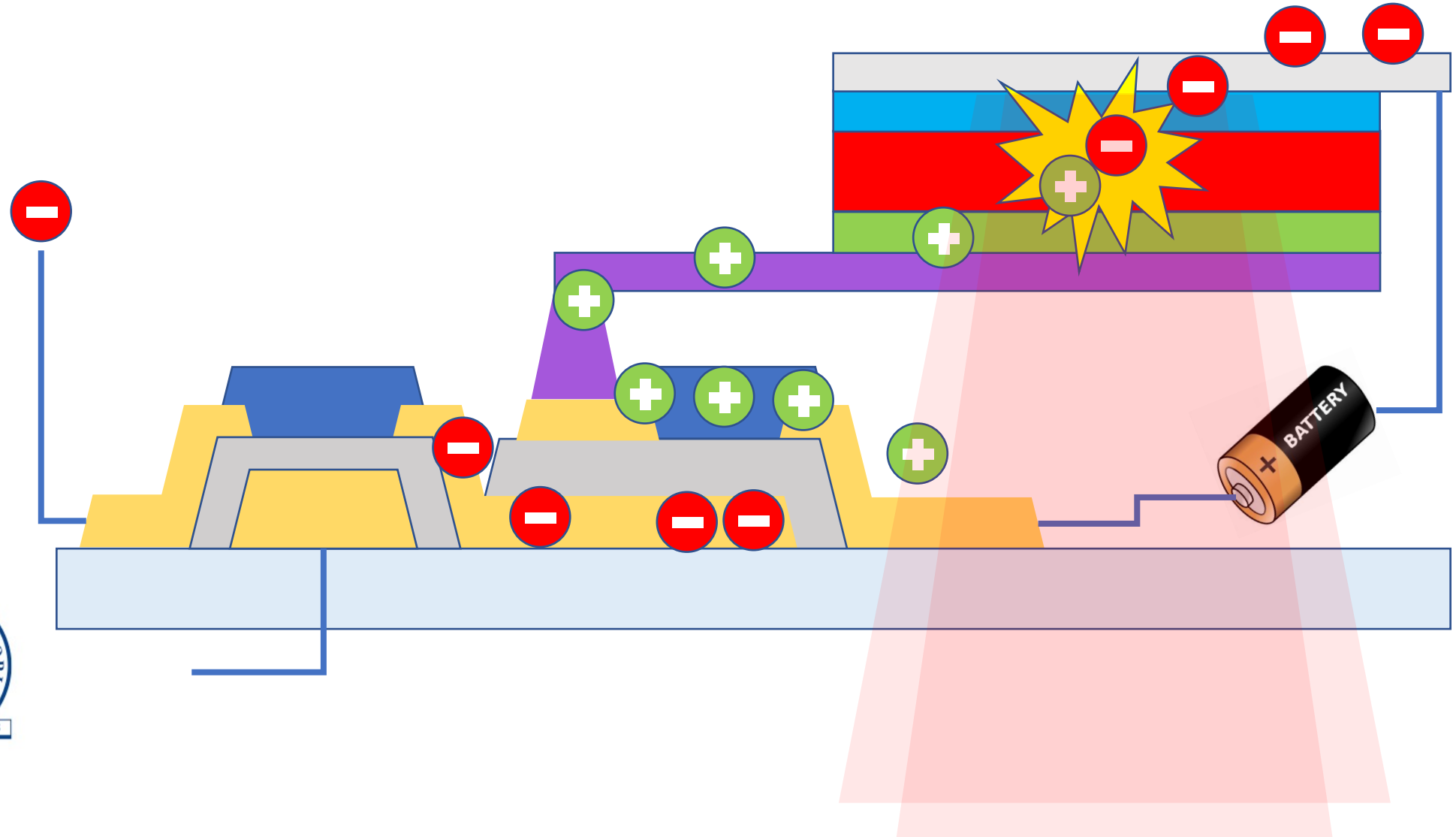
Two transistors and OLED



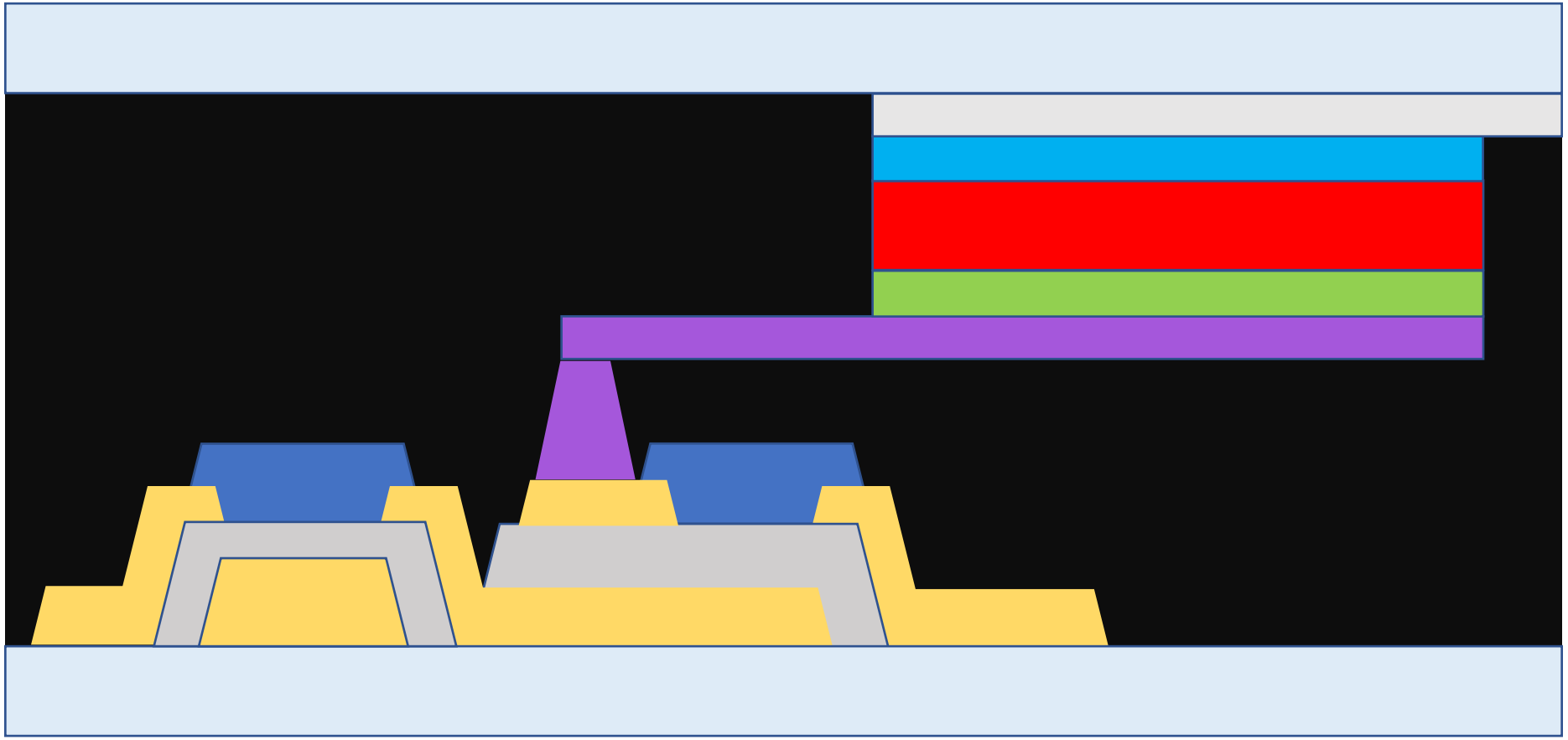
Two transistors and OLED



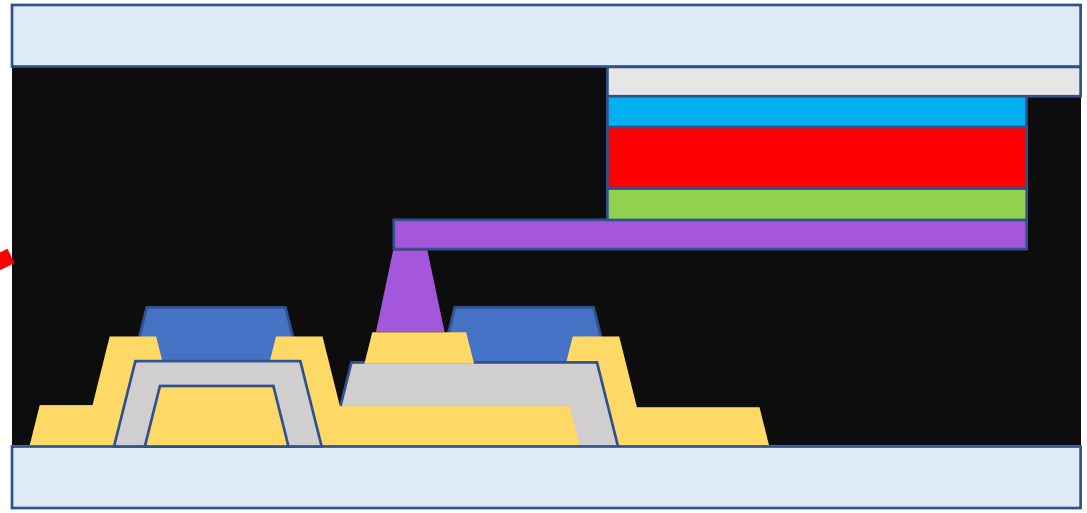
Two transistors and OLED



Encapsulation




4G LTE
100%
12:45
UNIVERZA V NOVI GORICI
SCIENTIA 1995 VINCES



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