

Could you design better smartphones?

Education in Chemistry

September 2018

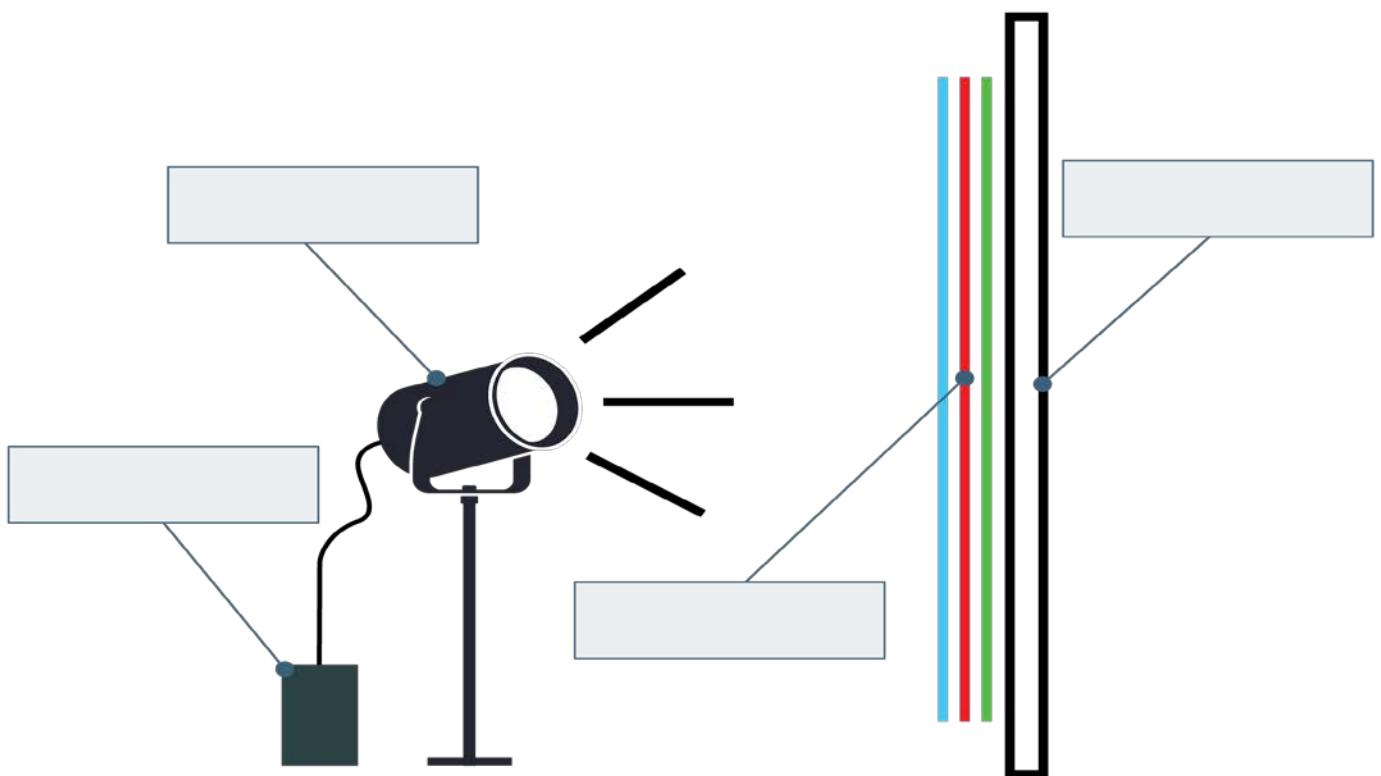
rsc.li/2vVc3Vi

Adam Boxer

Chemists are at the cutting edge of product design and manufacture. Read the article *Super-slimmed smartphones* (rsc.li/2vVc3Vi) about how some chemists are developing a new type of battery that could also serve as a phone screen, then answer the questions below using the article and your own knowledge.

1. Explain in terms phone design why having a two-in-one battery and screen is an advantage.

2. Below is a schematic diagram of a conventional (normal) phone screen. Use the article to write labels to the diagram.

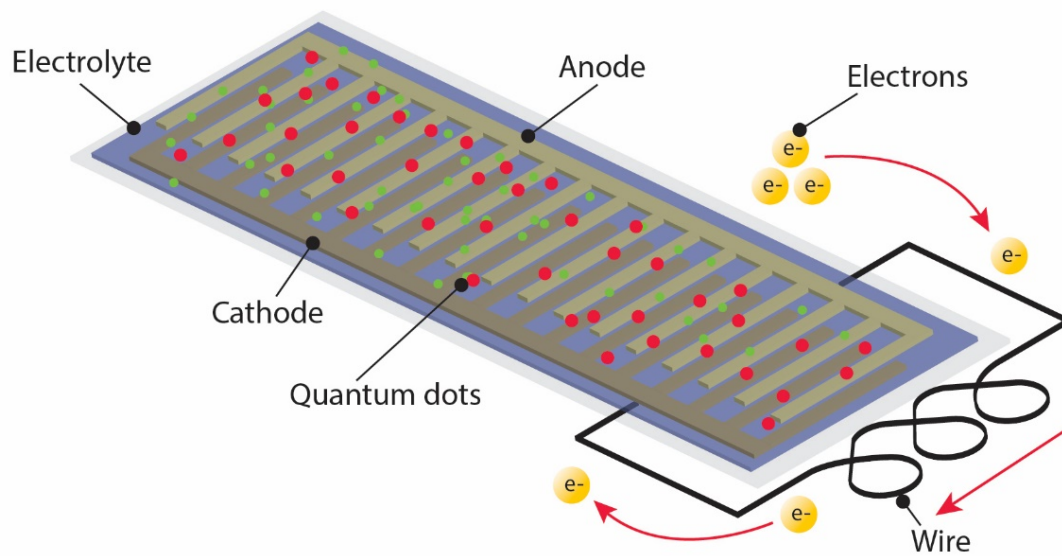


3. Phone screens need to be tough, transparent, unreactive and conductors of electricity. Answer these questions about the properties of solid potassium chloride.
- Is potassium chloride tough or brittle?
 - Is potassium chloride transparent?
 - What might happen if potassium chloride is put into water?
 - Does solid potassium chloride conduct electricity?

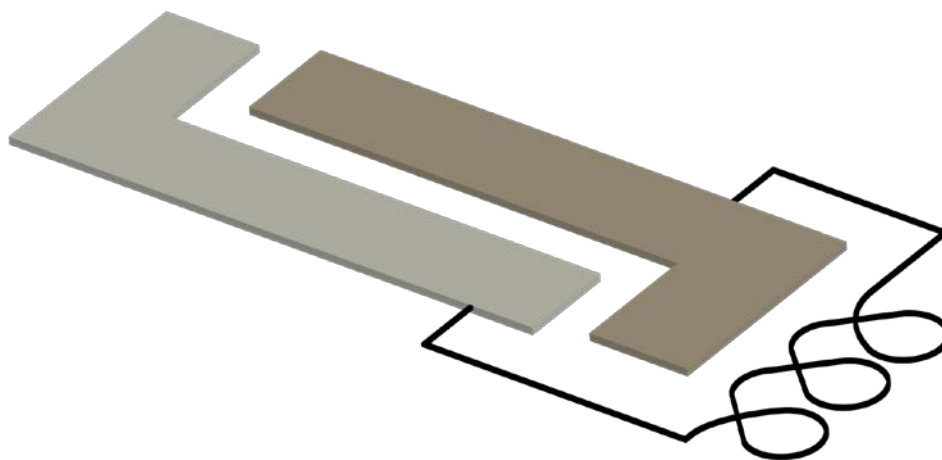
Do you think potassium chloride would be an appropriate material to use for phone screens? Explain your answer.

4. Some scientists have tried to attach a layer of graphene to a transparent material. By discussing the structure of graphene, explain why you think they have done this.

5. The screen-battery anode and cathode have a 'hair comb' shape:



Suggest why the scientists chose a 'hair comb' shape instead of the shape shown below for the anode and cathode.



6. Explain why a chemical cell with one electrode made of magnesium and another made of copper will produce a larger potential difference than a cell where one electrode is zinc and the other is copper.
7. Read the section of the article *Super-slimmed smartphones* under the subheading 'A touch of quantum glow'.
List the properties and components the new screen-battery has that are different to conventional batteries.
8. Read the last paragraph of the article *Super-slimmed smartphones*. Environment-poisoning is where harmful chemicals in everyday products end up in the ecosystem. Explain why this should be considered as part of a device's design and life cycle assessment.