# **STEM Connections**

## Microscope -Steel Structure Dr Fanfu Wu

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### How do microscopes work?

An optical microscope is an instrument that can be used to observe small objects through enhanced light, even cells and microstructures. The surface of an object is magnified through lens in the microscope. These lens bends light toward the eye and makes an object appear larger than it actually is. There are other types of microscopes for material scientists to use more often; for example, scanning electron microscope (SEM) and *transmission electron microscopy* (TEM) are microscopy techniques in which a beam of electrons is used to form an image. The microscopy technology has brought the capability for material scientist to understand the structures of different materials.

Microscope could also let us understand the chain structured polymer products, for example, plastic bags are created from a repeating group of synthetic molecular known as polymers. A steel specialist could observe the microstructure of steels and relate the microstructures to the mechanical and magnetic properties. Then based on the microstructure change and electromagnetic signal change, they could design the sensors for the steels processing to achieve desired steel properties.

### How to make your own water microscope

Suitable year groups: Year 4, Year 5, Year 6, Year 7, Year 8

#### Learning Objectives:

- To identify different types of materials based on their properties (KS2)
- To examine the parts of different plants and flowers (KS2)
- To understand how light is transmitted through the water and the scattering (KS3)
- To explain the focusing of the light by the water using the ray model (KS3)
- To explain how the properties of materials vary due to their structure and arrangement of particles (KS3)

#### Materials required:

- A plastic cup
- Clingfilm/clear plastic
- Rubber band
- Scissors
- Water
- Different materials to look at

#### Estimated time: 20 minutes

Step by step instructions:

 Carefully cut a hole in the bottom side of your plastic cup.



 Cover the top of the cup with clingfilm. Make sure that this is tight. Secure it with a rubber band.

3. Place sample in the bottom of the cup.





4. Pour water on top of the cling film.

5. Have a look at your sample and the differences between various materials.

## Ideas to explore the concept further

- Could you use another liquid instead of water to increase the magnification?
- How could you improve the focus of your microscope?