# Giant Interactive Crystal Growth

Instructions for demonstrators

## About this activity

‘Giant Interactive Crystal Growth’ is a big hands-on activity about crystal growth using Zoob construction toys. Lots of people can get involved at once and there are plenty of talking points about crystals and different stages of crystal growth.

## Key information

Science topic(s): Crystals, crystallisation, framework materials.

Age range: 5+, including adults.

Activity duration: 20 minutes – 4 hours.

Health and safety considerations: Zoob pieces can pinch fingers.

Special requirements: Floor space of at least 4 m2.

## A toy structure made of plastic balls Description automatically generated

## What’s in the box?

1. These instructions for demonstrators.
2. Risk assessment.
3. Materials for the activity:
   1. Zoob pieces (lots! Including some made up as a seed layer if you’re lucky, sorted into boxes of different colours if you’re even luckier)
   2. Foam interlocking floor mat.
   3. Molymods or ping pong balls.
   4. Duct tape.
4. Information to display about the activity (laminated A4 sheet).
5. Postcards about the activity to give out (A6 card).
6. Stickers for giving out to/counting participants.

## How to set up this activity

1. Assemble the foam interlocking floor mat on the floor. Check for any loose edges that could be trip hazards and secure them with duct tape.
2. If it is not already assembled, put together 1-2 layers of ‘crystal’ using Zoobs, covering an area about 30-40 cm2. Make it as regular and repeating as possible. This works best with blue and yellow pieces.
3. Have 1-2 boxes of Zoobs out, ready for people to take pieces from.
4. Display the laminated information and postcards somewhere nearby (e.g., on a table) and have the stickers on hand to give out when participants have completed the activity.

## How to demonstrate this activity

1. Invite people to take a few pieces and add them to the growing crystal. *You can say that we’re trying to build as big a crystal as we can over the whole event.*
2. As they add pieces, you can talk about **what crystals are** and that in this activity we are growing a crystal, just on a larger scale.

Potential discussion points:

Crystals are all around us, from metals and rocks to cellulose in plants and polymers in plastics. The Yeung research group at UoB is investigating how crystals form in materials known as ‘metal-organic frameworks’, which are a bit like Zoobs but the building blocks (metal ions and organic linkers) around 109 (a thousand million) times smaller.

1. Depending on how they add the pieces, you can talk about crystals being **regular, repeating** structures. They can have **defects**, and even **amorphous** regions.
2. To look at the effects of **porosity** in the structure, invite the participants to drop one or two pingpong balls down from the top of the giant crystal. See how the balls travel faster through more open parts and slower (or even get caught) in the the less open parts.

Potential discussion point: The giant Zoob crystal has open spaces – these are similar to the pores in Framework materials, such as metal-organic frameworks and zeolites that are researched at UoB, which have important applications in gas storage, carbon capture, water purification, separations, catalysis, and sensing etc.

1. Invite the participants to come back later in the day to see how the crystal has grown. Later in the day, if you have taken photos of the crystal (remember to avoid taking photos of any people that can be recognised) you could show participants how the crystal has progressed from the start.

## Taking this activity further

You can use the activity to discuss any of these subjects:

* Defects
* Amorphous material
* Epitaxial growth
* Heterogeneous nucleation
* Framework materials, applications in carbon capture, water purification, sensing.

## How to pack this activity away

* Disassemble the giant crystal, try to sort the Zoob pieces as you go (this helps with the activity next time).
* Discard any broken pieces.
* If there is space in the box, leave a seed crystal layer for the next time.
* Take the foam interlocking floor apart, wipe down and dry, then pack away in its case.

## This activity goes well with…

* The Nucleation Game
* Mineral crystals
* Crystallisation of a magic crystal tree

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