



**Mission:** How do we control properties of super thin materials?

**Age:** 11+  
**Materials:** \$10

**Time:** 2 hrs (1 hr active)  
(Set-up: 15 min | Activity: 90 min including chilling time | Clean-up: 15 min)

## NGSS Alignment of Designing 2D Materials Activity

The information below may not include every area that this activity can be linked to NGSS concepts

### Disciplinary Core Ideas

#### PS1.A: Structure and Properties of Matter

- Grade 2
  - Different properties are suited to different purposes.
- Grade 3-5
  - Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means
- Middle School
  - Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms.
  - Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals).

### Performance Expectations

- 2-PS1-2: Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.
- MS-PS1-1: Develop models to describe the atomic composition of simple molecules and extended structures.

### Crosscutting Concepts

#### Cause and Effect

- Grade 3-5
  - Cause and effect relationships are routinely identified, tested, and used to explain change.
- Middle School
  - Cause and effect relationships may be used to predict phenomena in natural or designed systems.
  - Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability.



## Engineering and Science Practices

### Developing and Using Models

- **Grade 3-5**
  - Develop and/or use models to describe and/or predict phenomena.
  - Develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution.
- **Middle School**
  - Develop a model to predict and/or describe phenomena.
  - Develop a model to describe unobservable mechanisms.

### Analyzing and Interpreting Data

- **Grade 3-5**
  - Analyze data to refine a problem statement or the design of a proposed object, tool, or process.
  - Compare and contrast data collected by different groups in order to discuss similarities and differences in their findings.
- **Middle School**
  - Analyze data to define an optimal operational range for a proposed object, tool, process or system that best meets criteria for success.
  - Analyze and interpret data to determine similarities and differences in findings.

### Planning and Carrying Out Investigations

- **Grade 3-5**
  - Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.
  - Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.
  - Test two different models of the same proposed object, tool, or process to determine which better meets criteria for success.
- **Middle School**
  - Conduct an investigation and/or evaluate and/or revise the experimental design to produce data to serve as the basis for evidence that meet the goals of the investigation.
  - Collect data about the performance of a proposed object, tool, process, or system under a range of conditions.