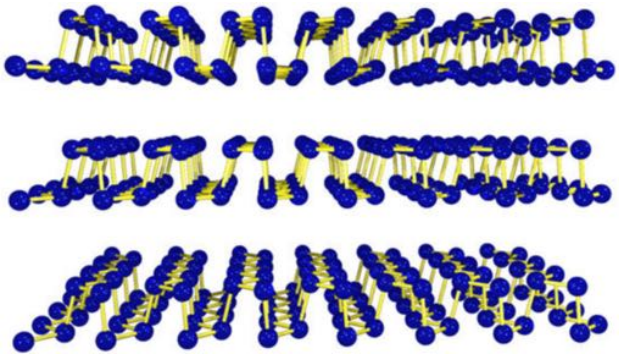
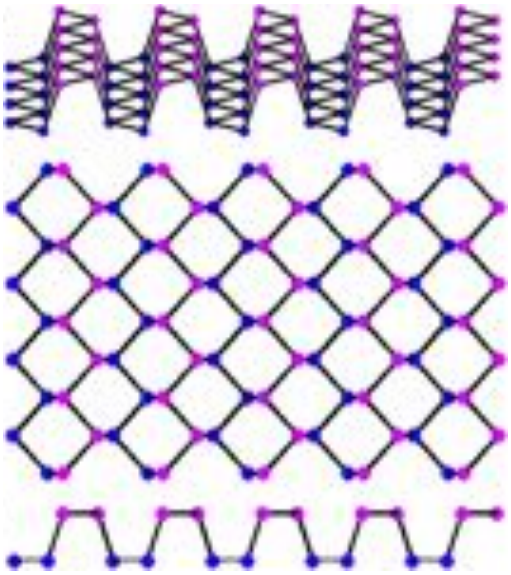
NANO @ HOME

Phosphorene



Phosphorene is a single sheet of phosphorus (P) atoms with a ridged structure. Because of these ridges, it conducts electricity differently depending on direction! This structure is a bit trickier to make because it's not just a flat sheet. We will use the cardboard tubes to help support the ridges.

1. You will need toothpicks, and one color of marshmallow to represent P atoms.
2. You will also need to use the cardboard tubes as temporary supports to help form the ridges.
3. Take 8 toothpicks, and arrange them in a zigzag using the template below. Connect them using marshmallows at the corners.
4. Repeat those steps and make 2 more zigzags.
5. Take 2 paper towel cardboard tubes (or tape together some toilet paper cardboard tubes to make them longer) and lay them next to each other parallel.
6. Lay one of the zigzags you just made between the two cardboard tubes. Take one of the other zigzags, but flip it so it's the mirror image, and carefully lay it across the top of one of the tubes so that the marshmallows at the corners point at each other. It might help to use a bit of tape to hold the zigzag in place.
7. Use more toothpicks to connect the upper zigzag with the lower zigzag.



8. Repeat with the other zigzag on top of the other cardboard tube, and connect to the lower zigzag.
9. Repeat step 3 to make more zigzags, and steps 6 and 7 to connect them to the existing zigzags.
10. You've just made phosphorene! You can remove the cardboard tubes.

NANO@HOME

Phosphorene Template

Print out this sheet, cut out the two zigzag shapes and tape them together so that the two dashed lines overlap and match at the arrows: