

“Synthetic Photonic Crystals”

Polystyrene micro-spheres aggregate into an ordered arrangement similar to the structure of natural opal photonic crystals. Only certain wavelengths of light travel through the spheres (which are ~200nm diameter for this activity).

Activity:

Materials

Nanoscale polystyrene particles dissolved in water
Aluminum foil
Squeeze dropper
Straight edge (e.g. glass slide or other object)

Procedure

Place a drop of the solution on the aluminum foil.
Use the straight edge to distribute the liquid over the foil – making a thin film.
Allow the water to evaporate – it should do so fairly quickly. (you can blow on it to speed it up)

Discussion

Interference, diffraction, refraction and reflection

related standards:

science inquiry
light, heat, electricity and magnetism
properties and changes of properties in matter
structure and properties of matter
interactions of energy and matter

RESOURCES

NISENet activity: “butterflies, bees and opals”
Polymer microspheres sources – bangs lab, polysciences inc.
http://www.bangslabs.com/products/polymer_microspheres
http://www.polysciences.com/Catalog/Department/Product/98/categoryId_373/productId_471/