

Activity 4

A researcher in your group has established a way to synthesize nano-crystalline silicon, which they call “silicon quantum dots”. They claim that the dots can emit light in the visible spectrum if they are the right size. Another person in your group says that silicon is an indirect band gap semiconductor, so it won’t emit light efficiently, and it emits in the infrared since its band gap is 1.10 eV.

Can the behavior of bulk silicon be modified by quantum confinement to create silicon quantum dots that emit light in the visible?

What size would such dots need to be? How does that size compare to the exciton (electron-hole pair) radius of 5 nm in bulk silicon?

