Online and 3D-printed resources for introducing crystallographic concepts

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We have developed a website that illustrates fundamental unit-cell types, unit cell contents, close packing of atomic layers, and the structures of selected elements and ionic materials. A companion set of 3D-printed models of the unit cell contents of simple cubic, body-centered cubic, face-centered cubic, and hexagonal close-packed structures helps students connect the computer representations to physical models. We have incorporated these materials into our first-year chemistry laboratory course, enhancing a model-building exercise with computer representations and 3D building blocks to demonstrate lattice-point sharing, packing efficiency, and coordination number.

Additional web-based materials for teaching symmetry have been extended to include crystallographic point groups and the symmetry-relationships found in selected space groups and are suitable for use in upper-level undergraduate courses. While students may have been introduced to symmetry in other courses such as Inorganic or Physical Chemistry, these resources emphasize crystallographic symmetry and the notation used within crystallography. Additionally, we have developed an interactive 2D Fourier transform website that demonstrates the reciprocal relationships found in diffraction. This site serves as a natural extension to the popular optical transform demonstration.

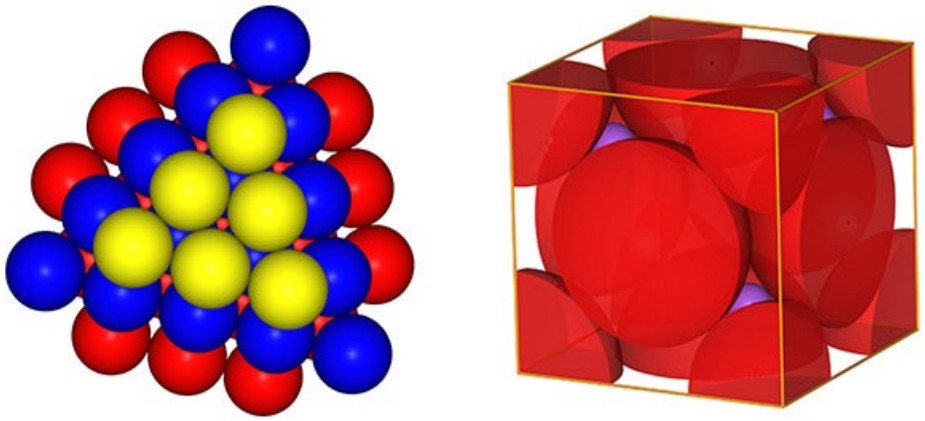

Figure 1