Copy of a printed diagram referenced as "Typical metallic structures"

Contributors

Fuller, Watson, 1935-

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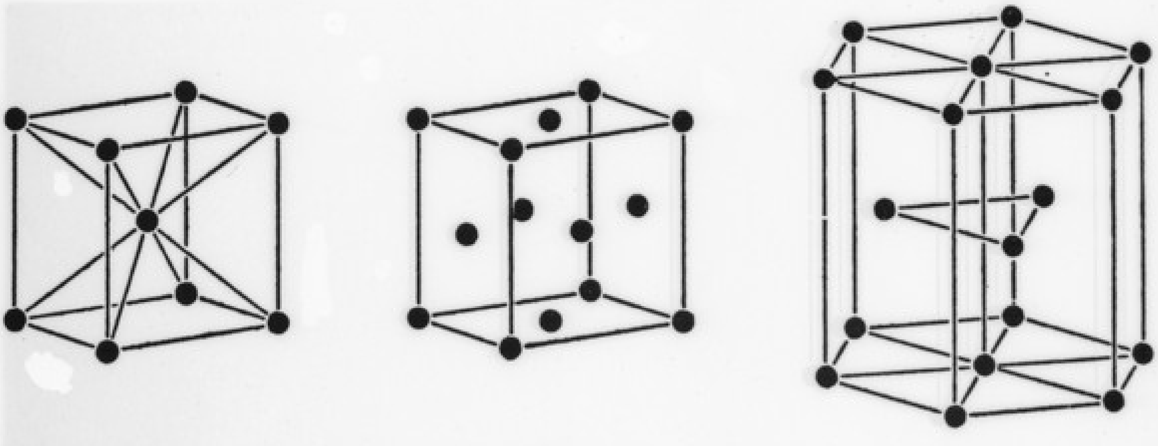
on p. 272) of $Li^+(1s)^2$ is only 0·60 A. Such closely bound electrons will be almost unaffected by the presence of other lithium atoms, so that we are led to the conclusion that there is one, and only one, valence electron per atom, to confer metallic property on the crystal. The bonding that exists between each atom and its fourteen near neighbours must be almost entirely due to these solitary electrons, one per atom, whose bonding power is therefore 'spread-out'. This follows equally well from a comparison of the bond length (2·67 A) in the diatomic molecule Li_2 with the distance of closest approach (3·03 A) in the metal. The increased length in the metal implies that the 'bonds' are weaker: but of course there are more of them, with the result that the total binding energy per atom increases from 13 kcal./gm. atom in the molecule to 39 kcal./gm. atom in the metal. The valence, or conduction, electrons are therefore more tightly bound in the metal than in the molecule, but their bonding power has to be


(a) (b) (c)

Typical metallic structures.
(*a*) body-centred cubic: example, lithium; (*b*) face-centred cubic: example, copper; (*c*) hexagonal close-packed: example, zinc.