Materials Structure & Bonding

Review Seminar

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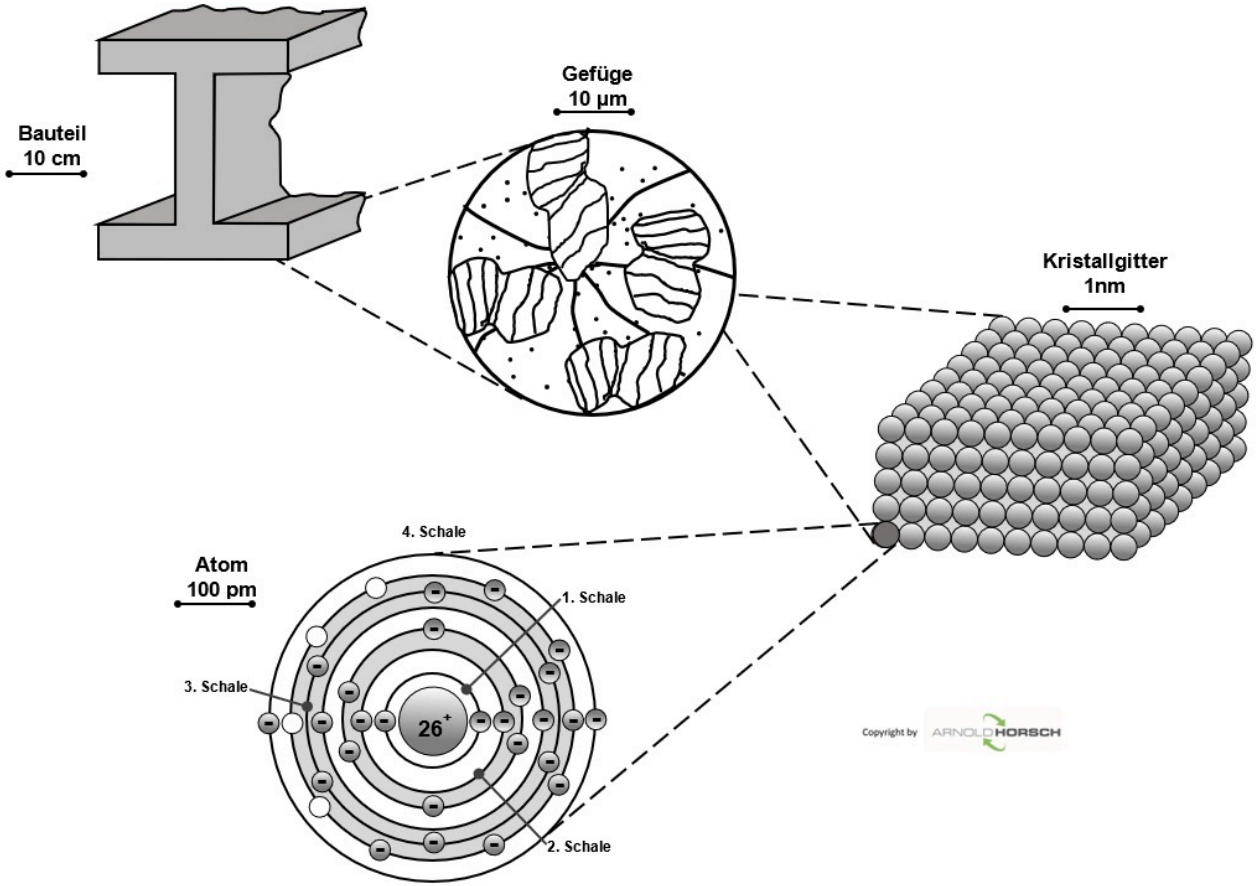
Duration: 90 minutes

Format: Interactive workshop with exercises



Knowledge check

Q1: Which bond type enables electrical conductivity in solid state?

a) Ionic

b) Covalent

c) Metallic

d) Van der Waals

Q2: What makes metals ductile?

a) Strong covalent bonds

b) Non-directional metallic bonds

c) Weak van der Waals forces

d) Ionic lattice structure

Q3: H_2O has a higher boiling point than H_2S because of:

a) Higher molecular weight

b) Hydrogen bonding

c) London dispersion forces

d) Ionic character

Q4: Which bond type is present between polymer chains in thermoplastics?

a) Covalent bonds

b) Ionic bonds

c) Metallic bonds

d) Van der Waals forces

Q5: Why is diamond extremely hard?

a) Ionic bonds in all directions

b) Metallic bonding

c) 3D covalent network

d) Strong van der Waals forces

Q6: Graphite can be used as a lubricant because:

a) It has metallic bonds

b) Weak forces between layers

c) It's very hard

d) It dissolves in oil

Q7: Primary bonds are typically how much stronger than secondary bonds?

a) 2-5 times

b) 10-100 times

c) 1000 times

d) About the same

Q8: "Like dissolves like" means:

a) All liquids mix together

b) Similar polarities dissolve each other

c) Only water dissolves salts

d) Metals dissolve in acids

Q9: In metallic bonding, valence electrons are:

a) Transferred to non-metals

b) Shared in pairs

c) Delocalized in electron gas

d) Removed completely

Q10: Which property is NOT typical of ionic compounds?

a) High melting point

b) Brittleness

c) Electrical conductivity in solid state

d) Solubility in polar solvents

Q11: Why can't thermosets be melted and reshaped?

a) Too high melting point

b) Covalent crosslinks between chains

c) Ionic bonds are too strong

d) They decompose when cooled

Q12: Silicon carbide (SiC) is used in cutting tools because:

a) It's metallic

b) It has a 3D covalent network

c) It's flexible

d) It conducts electricity

Q13: Which explains why noble gases rarely form compounds?

a) They have no electrons

b) Complete outer electron shell

c) Too many protons

d) Very high electronegativity

Q14: London dispersion forces increase with:

a) Decreasing molecular size

b) Increasing molecular size

c) Temperature

d) Pressure

Discussions

- What is the meaning of bond (bonding energy)?
- Describe how the following material properties vary with bond energy:
  (a) The melting temperature
  (b) The coefficient of thermal expansion

- What is the difference between atomic mass and atomic weight?
- Identify the nature of atomic bonding (directional or nondirectional) for all types of chemical and physical atomic bonding.