

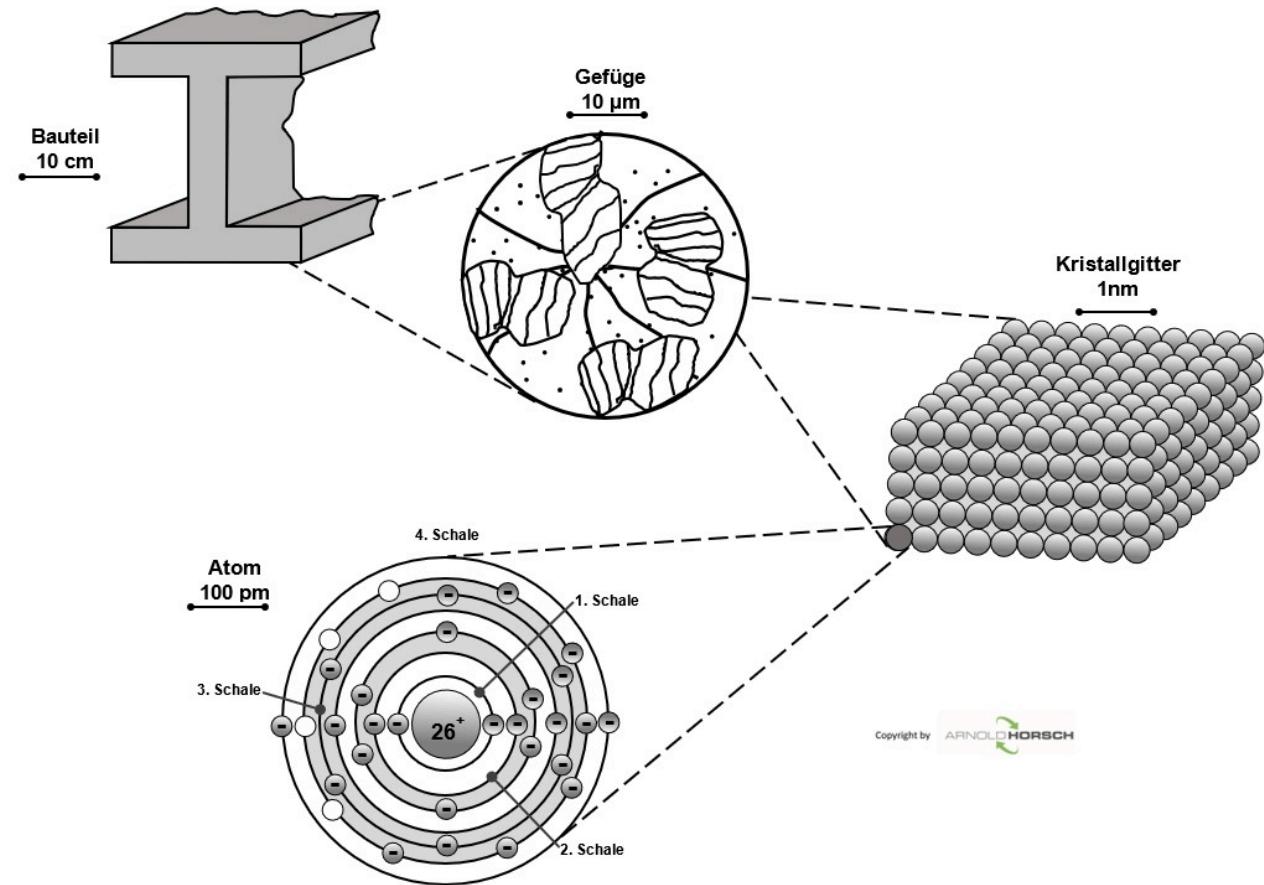
Materials Structure & Bonding

Review Seminar

Prof. Dr.-Ing. Christian Willberg

Duration: 90 minutes

Format: Interactive workshop with exercises



Learning Objectives

By the end of this seminar, you should be able to:

- ✓ **Classify** materials based on their bonding type
- ✓ **Predict** material properties from atomic bonding
- ✓ **Explain** structure-property relationships
- ✓ **Apply** bonding concepts to engineering problems
- ✓ **Evaluate** materials for specific applications
- ✓ **Analyze** material failure mechanisms

Agenda

Time	Activity	Method
0-20 min	Knowledge Check	Interactive Quiz
20-50 min	Bond Type Workshop	Group Work
50-75 min	Problem Solving	Exercises
75-85 min	Advanced Concepts	Discussion
85-90 min	Exam Preparation	Q&A

Knowledge check

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

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- b) Non-directional metallic bonds
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Q3: H₂O has a higher boiling point than H₂S because of:

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- b) Hydrogen bonding
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Q5: Why is diamond extremely hard?

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- b) 10-100 times
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Q8: "Like dissolves like" means:

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Q9: In metallic bonding, valence electrons are:

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- b) Brittleness
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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.