Seminar Materials & Structure SS 25

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Abstract

This is the website for the Seminar Materials & Structure

* [Pelz Lab website](https://pelzlab.science)
* [Studon Link](https://www.studon.fau.de/studon/ilias.php?baseClass=ilrepositorygui&ref_id=6216946)

## 1 Tips for Giving a Great Seminar Presentation

### 1.1 Preparing Your Presentation

* **Understand Your Audience**  
  Keep in mind that your audience consists of undergraduate students who may not be familiar with complex technical details. Aim for clarity and accessibility.
* **Structure Your Presentation Clearly**  
  A good presentation should have:
  + **Introduction** – Briefly introduce the topic and why it matters.
  + **Main Content** – Explain key concepts, methods, and applications.
  + **Case Studies or Examples** – Provide real-world examples to keep the audience engaged.
  + **Conclusion** – Summarize key takeaways and open the floor for discussion.
* **Use Visuals Effectively**
  + Include **diagrams, charts, and images** to explain complex concepts.
  + Avoid cluttered slides—**less text, more visuals**.
  + Use consistent fonts and colors to maintain readability.
* **Practice Your Timing**
  + Keep your presentation within the allotted time (typically 10-20 minutes).
  + Rehearse in front of a friend or a mirror to refine your delivery.

### 1.2 Delivering Your Presentation

* **Speak Clearly and Confidently**
  + Avoid reading directly from slides or notes.
  + Maintain a steady pace and use pauses for emphasis.
* **Engage with Your Audience**
  + Make eye contact instead of staring at your slides.
  + Ask rhetorical questions or invite short interactions to keep attention high.
* **Manage Nervousness**
  + Take deep breaths before starting.
  + Use hand gestures naturally to emphasize points.
  + Remember, the audience is there to learn—not to judge you!

### 1.3 Handling Questions and Discussions

* **Be Prepared for Questions**
  + Anticipate potential questions and have extra information ready.
  + If you don’t know the answer, admit it and suggest ways to find out.
* **Encourage Participation**
  + Ask the audience their thoughts or experiences related to the topic.
  + Use real-world scenarios to spark discussion.

### 1.4 Technical Aspects to Consider

* **Test Your Equipment**
  + Make sure your slides work on the presentation system in advance.
  + Have a backup plan (e.g., printed notes or USB drive).
* **Use a Strong Opening and Closing**
  + Start with a **compelling hook**—a question, statistic, or short story.
  + End with a strong statement or a thought-provoking idea.

### 1.5 Final Reminders

* **Stay Within the Time Limit** – Respect the audience’s time.
* **Keep It Simple** – Don’t overload slides with unnecessary details.
* **Have Fun!** – Passion and enthusiasm make a big difference.

By following these tips, you’ll be able to deliver a clear, engaging, and impactful seminar presentation. Good luck!

## 2 Possible Topics

### 2.1 Popular Science Books on Materials Science

#### 2.1.1 General Materials Science

1. **Stuff Matters: Exploring the Marvelous Materials That Shape Our Man-Made World** – *Mark Miodownik*  
   A fascinating exploration of the materials that define our world, from glass to chocolate, written by a materials scientist.
2. **The New Science of Strong Materials: Or Why You Don’t Fall Through the Floor** – *J.E. Gordon*  
   A classic introduction to how materials work, explaining why some materials are strong and others are not.
3. **Structures: Or Why Things Don’t Fall Down** – *J.E. Gordon*  
   A fun and informative look at the physics of structures, from bridges to bones.
4. **Made to Measure: New Materials for the 21st Century** – *Philip Ball*  
   Explores how scientists are designing new materials at the molecular level for future applications.
5. **Materials: A Very Short Introduction** – *Christopher Hall*  
   A concise and accessible overview of materials science, from their atomic structure to everyday applications.
6. **The Science and Engineering of Materials** – *Donald R. Askeland & Wendelin J. Wright*  
   A comprehensive yet readable textbook covering the fundamental principles of materials science.

#### 2.1.2 Nanotechnology & Advanced Materials

1. **Plenty of Room for Everyone: Nanotechnology in the Marketplace** – *Luis E. Liz-Marzán*  
   Examines the real-world applications of nanotechnology and how it is transforming industries.
2. **Soft Machines: Nanotechnology and Life** – *Richard A.L. Jones*  
   Explores the connections between nanotechnology and biological systems.
3. **Molecular Machines: The Story of Nanotechnology** – *Philip Ball*  
   A deep dive into how scientists are building tiny machines at the molecular scale.
4. **Nanotechnology for Dummies** – *Earl Boysen & Nancy C. Muir*  
   A beginner-friendly guide to the science and potential of nanotechnology.
5. **The Nanotech Pioneers: Where Are They Taking Us?** – *Steven A. Edwards*  
   Discusses the history and future of nanotechnology, including its ethical and societal implications.

#### 2.1.3 Metamaterials & Smart Materials

1. **The Magic of Metamaterials** – *Jürgen Stampfl, Richard W. Siegel, and Hans J. Fecht*  
   Explains how metamaterials with unique properties are changing science and engineering.
2. **Metamaterials: Physics and Engineering Explorations** – *Nader Engheta & Richard W. Ziolkowski*  
   A technical yet engaging overview of how metamaterials manipulate electromagnetic waves.
3. **Smart Materials and Structures** – *M. V. Gandhi & B. S. Thompson*  
   Covers materials that change properties in response to external stimuli, like shape-memory alloys.

#### 2.1.4 History & Social Impact of Materials Science

1. **The Alchemy of Us: How Humans and Matter Transformed One Another** – *Ainissa Ramirez*  
   Shows how materials have shaped human history and culture in surprising ways.
2. **Why Things Break: Understanding the World by the Way It Comes Apart** – *Mark E. Eberhart*  
   A look at the science of failure in materials, from airplane crashes to crumbling buildings.
3. **The Substance of Civilization: Materials and Human History from the Stone Age to the Age of Silicon** – *Stephen L. Sass*  
   Explores the history of materials and how they have driven human progress.
4. **The Elements of Power: Gadgets, Guns, and the Struggle for a Sustainable Future in the Rare Metal Age** – *David S. Abraham*  
   Examines the role of rare metals in modern technology and the geopolitical challenges of securing them.

### 2.2 Materialism Podcast

#### 2.2.1 Fundamentals & Classic Materials Science Topics

1. **Episode 95: You Don’t Know Anything About Steel**  
   Steel is foundational to engineering and an excellent topic for materials science students.
2. **Episode 97: Titanium**  
   A widely used material in aerospace and medical fields, great for discussing material properties and applications.
3. **Episode 91: High Entropy Alloys**  
   A modern and rapidly evolving topic in metallurgy, providing insights into novel materials design.
4. **Episode 99: Bulk Metallic Glasses**  
   A fascinating and relatively new class of materials that challenges conventional metallurgy.
5. **Episode 93: An Introduction to Pyrometallurgy**  
   Covers essential metallurgical processes, useful for students interested in materials processing.
6. **Episode 92: The Quest for Pure Uranium**  
   Offers historical and scientific insights into materials purification, with real-world impact.

#### 2.2.2 Emerging & Advanced Materials

1. **Episode 94: An Introduction to Quantum Materials**  
   Covers cutting-edge materials with applications in computing and electronics.
2. **Episode 96: Spark Ablation with VSParticle**  
   An advanced materials processing technique, great for discussing nanomaterials.
3. **Episode 86: PHAs and Biodegradable Plastic**  
   Sustainability is a huge topic in materials science, and PHAs are a great case study.
4. **Episode 101: All About Biomatter**  
   Discusses innovative ways to create materials from biological sources, tying into sustainability.
5. **Episode 81: New Materials for Carbon Capture**  
   Addresses a major environmental challenge through materials innovation.
6. **Episode 88: Accelerating Materials Discovery with Microsoft**  
   Explores the intersection of machine learning and materials science.

#### 2.2.3 Processing & Manufacturing Techniques

1. **Episode 67: Additive Manufacturing at General Electric**  
   Additive manufacturing (3D printing) is a hot topic with broad applications.
2. **Episode 35: Spark Plasma Sintering**  
   A widely used technique for material densification with interesting scientific principles.
3. **Episode 79: Cryogenic Milling at Cal Nano**  
   A unique and lesser-known method for altering material properties through extreme cooling.

#### 2.2.4 Engineering Failures & Case Studies

1. **Episode 90: The Big Dig Incident**  
   Examines the consequences of material selection errors, making it a strong case study for engineering ethics.
2. **Episode 45: Was the Challenger an Engineering Failure?**  
   A major historical failure with deep material science implications.
3. **Episode 42: What Really Sunk the Titanic?**  
   A mix of history and materials science, great for an engaging presentation.
4. **Episode 26: When Materials Failure Leads to Wildfire**  
   Covers the role of materials science in preventing large-scale disasters.

## References