Karlsruhe Institute of Technology

IAM
Institute for Applied Materials

Plasticity

Lecture for “Mechanical Engineering” and “Materials Science and Engineering”
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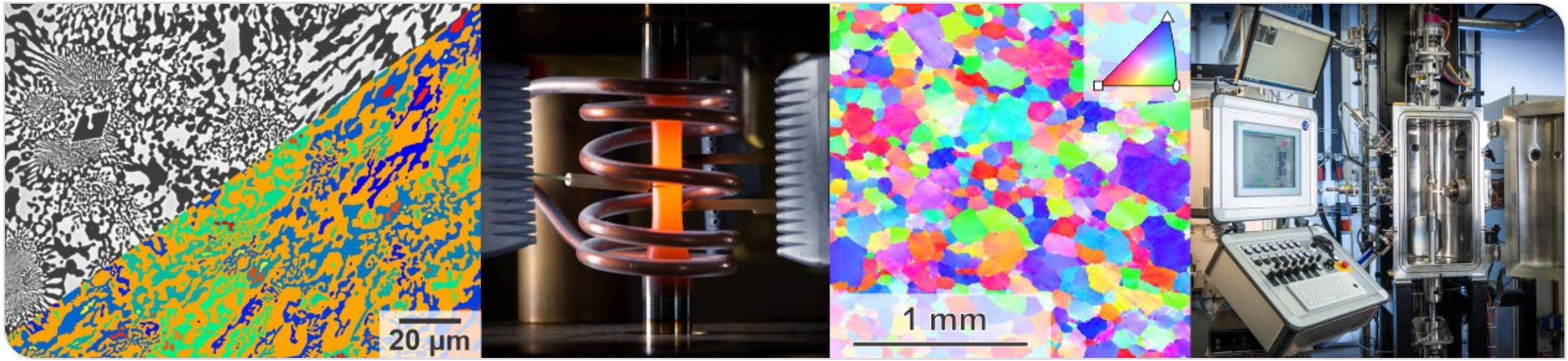

Literature

- A very **comprehensive, research-level description of plasticity in metals and alloys** in relation to general physical metallurgy can be found here:
  - [English] R.W. Cahn, P. Haasen (eds.): *"Physical Metallurgy"*, three-volume series, 4th ed., Amsterdam, etc.: North Holland (1996)
    http://services.bibliothek.kit.edu/primo/start.php?recordid=KITSRC052463656
- A rather large fraction of the lecture will deal with **dislocations as major contributors to plasticity** of metals, alloys and intermetallic compounds. Details can be found here:
  - [English] J. P. Hirth, J. Lothe: *"Theory of Dislocations"*, 2nd ed., Malabar, USA: Krieger Publishing Company (1982, reprint 1992)
    http://services.bibliothek.kit.edu/primo/start.php?recordid=KITSRC070938105
  - [English] D. Hull, D. J. Bacon: *"Introduction to Dislocations"*, 5th ed., Amsterdam, etc.: Elsevier (2011)
    http://services.bibliothek.kit.edu/primo/start.php?recordid=KITSRC383083990
    (free via KIT license)
- **Research-level discussions of certain dislocation-related aspects** can be found here:
  - [English] F. R. N. Nabarro (ed.), J. Hirth (ed.), L. Kubin (ed.): *"Dislocations in Solids",* series, several publishers (1979–2010)

Literature

- A **comprehensive lecture on physical metallurgy incl. plasticity** can be found here:
  - [German] J. Freudenberger: *"Skript zur Vorlesung Physikalische Werkstoffeigenschaften",* IFW Dresden (2004) https://www.ifw-dresden.de/de/ifw-institutes/ikm/lectures/vorlesungsskript-physikalische-werkstoffeigenschaften (public domain)
- A **comprehensive introduction to physical metallurgy with aspects of plastic deformation** can be found here:
  - [German] G. Gottstein: "*Materialwissenschaft und Werkstofftechnik: Physikalische Grundlagen*", 4th ed., Berlin, Heidelberg: Springer Vieweg, Springer-Verlag (2014) http://dx.doi.org/10.1007/978-3-642-36603-1 (free via KIT license)
  - [English] G. Gottstein: "*Physical Foundations of Materials Science*", 1st ed., Berlin, Heidelberg: Springer-Verlag (2004) https://doi.org/10.1007/978-3-662-09291-0 (not available in KIT BIB)
- Mostly **engineering aspects of plasticity** are described here:
  - [German] A. Rösler, H. Harders, M. Bäker: *„Mechanisches Verhalten der Werkstoffe"*, 2nd ed., Wiesbaden: B. G. Teubner Verlag (2016) http://dx.doi.org/10.1007/978-3-658-13795-3 (free via KIT license)
  - [English] G. E. Dieter: "*Mechanical Metallurgy*", 3rd ed. (SI Metric Ed.), London, etc.: McGraw-Hill (1988) https://services.bibliothek.kit.edu/primo/start.php?recordid=KITSRC055931553

Literature

- For some introductory information about **mechanical testing**, you might consult:
  - [English] K.H. Grote, E.K. Antonsson: “Springer Handbook of Mechanical Engineering”, New York: Springer Science+Business Media, LLC (2009) https://doi.org/10.1007/978-3-540-30738-9 (free via KIT license)
  - [English] J. Pelleg: “Mechanical Properties of Materials”, Dordrecht, Heidelberg, New York, London: Springer (2013) as part of the “Solid Mechanics and Its Applications” series

- For further **materials data**, please consult:
  - [English] Springer Materials: https://materials.springer.com/ (accessible via KIT network; incl. the Landolt-Börnstein compendium)

- In case you need **to resolve very specific problems related to plasticity** you have to perform **literature research with the common databases**:
  - KIT BIB: https://primo.bibliothek.kit.edu/primo_library/libweb/action/search.do?mode=Basic&vid=KIT&vl%28freeText0%29=plasticity&vl%28freeText0%29=plasticity&fn=search&tab=kit&srt=date
  - ISI Web of Knowledge: http://www.webofknowledge.com/ (access via KIT network)
  - Scopus: https://www.scopus.com/ (access via KIT network)