Micro-Nano Engineering

2 units (selection)

Tetsuo Iwata · Professor / Mechanical Science, Mechanical Engineering, Intelligent Structures and Mechanics Systems Engineering

Target⟩ This class introduces mesurement techniques and instruments for analyzing and developing new materials.

Outline⟩ Prof. Hanabusa lectures on the method of materials evaluation by means of X-ray diffraction: Principle of X-ray diffraction, macro and micro lattice strains, and residual stress measurement. Prof. Iwata reviews instrumental methods for extracting information on materials using optical and spectroscopic techniques: Scientific measurements, data processing, and instrumentation for chemical analysis.

Style⟩ Portfolio

Keyword⟩ ***X-ray structure analysis, scientific measurements***

Relational Lecture⟩ "**Materials Surface Performance Control**"(0.5), "**Advanced Micro-Nano Engineering**"(0.5), "**Instrument and Control Engineering**"(0.5)

Requirement⟩ Students are required to have a good understanging of undergraduate-level related subjects.

Goal⟩

1. To understand x-ray diffraction method and its application for material science
2. To understand scientific measurements and instrumentation technology

Schedule⟩

1. Basics of X-rays
2. Lattices and crystal structures
3. Crystal axes and reciprocal lattice
4. Scattering by an atom
5. Diffraction by small crystal
6. Kinds of residual stresses
7. X-ray stress measurement
8. Instruments for scientific measurements
9. Instrumental methods for chemical analysis
10. Microscopy and near-field optics
11. Analytical instruments 1
12. Analytical instruments 2
13. Electronics for scientific measurements
14. Data-processing method for scientific measurements
15. System design for scientific measurements
16. Report and presentation

Evaluation Criteria⟩ Assinments counts 100%.

Textbook⟩ To be introduced in the class.

Reference⟩ To be introduced in the class.

Contents⟩ http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=216886

Student⟩ Able to be taken by only specified class(es)

Contact⟩

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