Advanced Physical Chemistry

2 units (selection)

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Target〉 The main goal of this class is to understand the relationship between the principle of physical chemistry and real phenomena. Solvation, crystal growth are the main topics of this class.

Outline〉 (Solvation phenomena) Many chemical reactions are studied in liquids. Although solvation process plays a key role in these reactions, it is hard to understand the solvation quantitatively. In this lecture, "solvation thermodynamics" based on statistical mechanics is introduced and the methods to understand the solvation theoretically are explained. (Crystal Growth) Concepts and technology of crystal growth play an important role in design of materials and structure analysis. The main goal of this class is to provide a solid introduction to the fundamentals of crystal growth that can be used to describe various phenomena involving equilibrium conditions, rate processes, surface or interface properties, etc.

Style〉 Lecture

Keyword〉 ***solvation, crystal growth***

Fundamental Lecture〉 "**Basic Physical Chemistry**"(1.0)

Relational Lecture〉 "**Advanced Topics in Materials Science**"(0.5)

Requirement〉 Students are required to have a good understanding of undergraduate-level physical chemistry and related subjects.

Notice〉 授業を受ける際には，2 時間の授業時間毎に 2 時間の予習と 2 時間の復讐をしたうえで授業を受けることが，授業の理解と単位取得のために必要である．

Goal〉

1. To understand the fundamentals of solvation phenomena
2. To understand the fundamentals of crystal growth

Schedule〉

1. Statistical mechanics and thermodynamics
2. Chemical potential
3. Solvation thermodynamics
4. Solvation energy
5. Ion solvation
6. Solubilities of solids in supercritical fluids
7. Solvation in supercritical fluids
8. Thermodynamics of phase transition
9. Nucleation
10. Ideal growth rate of crystal
11. Surface structure and roughning transition
12. Surface kinetics
13. Protein crystallization
14. Protein crystallography
15. Colloidal crystals

Evaluation Criteria〉 Assignments count 100%.

Textbook〉 To be announced in the class

Reference〉 Yukio Saito, Statistical Physics of Crystal Growth, World Scientific, Singapore, 1996

Contents〉 http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=216869

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

Contact〉

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