Chair

2.2.9 Laboratory : Fibrous Biomaterials

Member :	Professor	Kimura, Tsunehisa, Dr. Eng.
	Assistant Professor	Kusumi, Ryosuke, Dr. Agric. Sci.
	Doctor's program	1
	Master's Program	6
	Undergraduate	2
	Researcher	1

A. Research Activities (2010.4-2011.3)

A-1. Main Subjects

a) Processing of Cellulosic Materials Using Magnetic Fields (I)

Filler-in-cellulosic matrix: we prepare 2-dimensional composite materials in which organic, inorganic, and metal particles are precisely aligned and patterned magnetically in cellulosic materials such as paper, cellophane, and films of cellulose derivatives. These composites are expected to exhibit anisotropic mechanical, optical, thermal, and electrical properties.

b) Processing of Cellulosic Materials Using Magnetic Fields (II)

Cellulose-as-filler: the sizes of cellulose fibers are controlled from millimeter to nanometer sizes. Depending on their size, they exhibit various physical properties. In addition, by introducing nano particles onto the fiber, further functionalization of fibers can be achieved. By alignment of these fibers using magnetic field, we can create 2-dimensional functional composites.

c) Development of the technique of magnetically oriented microcrystal arrays and its application to diffraction method

A magnetic method that we have developed enables to fabricate a magnetically oriented microcryatl array (MOMA) from a powder sample. The obtained MOMA gives rise to XRD equivalent to that obtained from a real single crystal. This method (MOMA method) will provide the third way, coming after the powder method and the single crystal method in the diffraction methods including X-ray and neutron method. Since the protein structure analysis is becoming important, encouraged by a current trend of biorefinery, we expect an increasing demand to our MOMA technique.

A-2.Publications and presentations

a) Publications

Original Papers(including book-reviews)

- F. Kimura, T. Kimura, K. Matsumoto, and N. Metoki, Single-Crystal Neutron Diffraction Study of Pseudo Single Crystal Prepared from Microcrystalline Powder, Cryst. Growth Des 10(1) 48-51 (2010).

- F. Kimura, T. Kimura, W. Oshima, M. Maeyama, and K. Aburaya, X-ray diffraction study on pseudo single crystal prepared from crystal belonging to point group 2. J. Appl. Crystallogr. 43 151-153 (2010).

- Tsunehisa Kimura *, Yusuke Umehara, Fumiko Kimura, Fabrication of a short carbon fiber/gel composite that responds to a magnetic field, C A R B ON 4 8 (2 0 1 0) 4 0 1 5 –4 0 1 8.

- Fumiko Kimura,† Kimihiko Mizutani,‡ Bunzo Mikami,‡ and Tsunehisa Kimura*,†, Single-Crystal X-ray Diffraction Study of a Magnetically Oriented Microcrystal Array of Lysozyme, Crystal Growth & Design, Vol. 11, No. 1, 2011.

Reviews

- T. Kimura, Magnetic pattering and alignment of crystalline polymers, cellulose, and metals. KINZOKU MATERIALS SCIENCE &TECHNOLOGY, 66(8) 274-277 (2010).

- T. Kimura, Magnetic alignment of cellulose and composites. SEN'I GAKKAISHI, 80(5), 378-384 (2010).

Reports,others

- R. Kusumi, Report on the 2010 International Chemical Congress of Pacific Basin Societies, Cellulose Commun. 18(1) 35-37(2011).

Patents

- T. Kimura, Precision alignment method by magnetic field.

- T. Kimura, 3-Dimentsionally aligned products and apparatus for its fabrication.

b) Conference and seminar papers presented

- The 6th Japan-France EPM Seminar 2010, 1 paper, invited

- 59th Society of Polymer Science, Japan Annual Meeting, 3 papers

- MAP4, 1 paper

- 17th The Cellulose Society of Japan2010, 4 papers

- 5th The Magneto-Science Society of Japan, 4 papers

- PACIFICHEM2010, 9 papers including 1 invited paper

- Seminars of Japan Society of Colour Material, 1 paper, invited

- Symposium for the 20th anniversary of the reconstructed JRR-3, 1 paper

A-3.Off-campus activities 1

Membership in academic societies

- Kimura, Tsunehisa, D.Eng. : The Magneto-Science Society of Japan (Vice President(2010), President (2011-)), The Cellulose Society of Japan (Board member)

A-3.Off-campus activities 2

Research grants

1. Grants-in-aid for Scientific Research(KAKENHI)

- B : T. Kimura

A-4.International cooperations and overseas activities 1

International meetings(country,roles)

- Kimura, Tsunehisa : International Conference on Magneto-Science (International Advisory Board , Programm Committee)

A-4.International cooperations and overseas activities 2

Visiting Research Scholars

- Visiting Research Schlar　1（Iran）

B.Educational Activities (2010.4-2011.3)

B-1.On-campus teaching

a) Courses given

- Undergraduate level : Forest Science Ⅱ (Kimura) Physical Chemistry in Bio-materials(Kimura), Pulp and Paper (Yamauchi), Laboratory Course in Forest and Biomaterials Science II (Yamauchi, Kusumi), Laboratory Course in the Basic Forest and Biomaterials Chemistry (Yamauchi, Kusumi), Laboratory Course in the Biomaterials Chemistry II (Kimura, Kusumi), Seminar in Forest and Biomaterials Science (Kimura, Kusumi)

- Graduate level : Fibrous Biomaterials I (Kimura), Seminars in Fibrous Biomaterials (Kimura, Kusimi), Laboratory Course in Fibrous Biomaterials (Kimura, Kusumi)

B-2.Off-campus teaching etc.

Open lectures, etc.

- T. Kimura: Open lectures orgnaized by Division of Forest and Biomaterials Science, Kyoto University

- R. Kusumi: Open lectures orgnaized by Division of Forest and Biomaterials Science, Kyoto University