

Medical Instrument (Biomedical Information)

1. Staffs and Students (April, 2010)

Professor	Kenji YASUDA	
Associate Professor	Tomoyuki KANEKO	
Assistant Professor	Fumimasa NOMURA	
Project Assistant Professor	Tomoyo HAYASHI	
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2. Purpose of Education

Medical instrument (Biomedical information) is a branch of institute of biomaterials and bioengineering which deals with the measurement of epigenetic information and memorization stored in living system such as brain (neural network system), immune system, and cardio systems caused by environmental hysteresis. Main objective of medical instrument in the graduate course is to provide students opportunity to study fusion of latest technologies of nano- and bio-tech, and to develop artificial organ model on chip for drug discovery and toxicology use.

3. Research Subjects

- 1) Studies on Epigenetic Information Stored Living System.
- 2) Constructing "On-chip Organ Model" using Nano-Bio Technology.
- 3) Bio-computing using "Real Neural Network on Chip".
- 4) New Drug Discovery Technology applying Single Molecule Measurement.

4. Publications

Original Articles

1. Terazono H, Anzai Y, Soloviev M, Yasuda K. Labeling of live cells using fluorescent aptamers: binding reversal with DNA nucleases. *J Nanobiotechnol*, 8(1), 8, 2010.
2. Kim H, Negishi T, Kudo M, Takei H, Yasuda K. Quantitative backscattered electron imaging of field emission scanning electron microscopy for discrimination of nano-scale elements with nm-order spatial resolution. *J Electron Microscop* (Tokyo), 59(5), 379-385, 2010.
3. Kim H, Takei H, Yasuda K. Production of size-controlled nanoscopic cap-shaped metal shells. *Jpn J Appl Phys*, 49(4), 48004 1-2, 2010.
4. Kim H, Kira A, Yasuda K. Non-amplified quantitative detection of nucleic acid sequences using a gold nanoparticle probe set and field emission scanning electron microscopy. *Jpn J Appl Phys*, 49(6), 06GK07 1-7, 2010.
5. Terazono H, Takei H, Hattori A, Yasuda K. Development of a high-speed real-time PCR system using a circulating water-based rapid heat-exchange. *Jpn J Appl Phys*, 49(6), 06GM05 1-5, 2010.
6. Terazono H, Takei H, Hattori A, Yasuda K. Development of a high-speed real-time PCR system for rapid and precise nucleotide recognition. *SPIE 2010 Defense and Security*, 76730U, 2010.
7. Terazono H, Takei H, Hattori A, Yasuda K. Development of an integrated system for rapid detection of biological agents. *SPIE 2010 Defense and Security proceeding*, 766503, 2010.
8. Hattori A, Yasuda K. Comprehensive study of micro gel electrode for on-chip electrophoretic cell sorting. *Jpn J Appl Phys*, 49(6), 06GM04 1-4, 2010.
9. Kim H, Takei H, Yasuda K. Production of Nanoparticles Using Several Materials for Labeling of Biological Molecules. *Jpn J Appl Phys*, 49(8), 87001 1-7, 2010.
10. Hayashi M, Yasuda K. Simple Microfluidic Continuous Concentration of Microparticles with Different Dielectric Constants Using Dielectrophoretic Force in a V-Shaped Electrode Array. *Jpn J Appl Phys*, 49(9), 97002 1-5, 2010.
11. Matsumura K, Yagi T, Hattori A, Soloviev M, Yasuda K. Using single cell cultivation system for on-chip monitoring of the interdivision timer in *Chlamydomonas reinhardtii* cell cycle. *J Nanobiotechnol*, 8, 23, 2010.
12. Yasuda K, Kaneko T, Nomura F. On-Chip Cellomics for Cardiotoxicity: Cell Network Model For Re-Construction of Higher Complexity of Organs. *The Open Conference Proceedings Journal*, 1, 168-177, 2010.
13. Yasuda K, Kaneko T, Nomura F. On-Chip Pre-Clinical Cardiac Toxicity: Testing Compounds Beyond hERG and Qt Using hES/hiPS Cardiomyocyte Re-Entry Cell Network Model On A Chip. *Proceeding of The 14th International Conference on Miniaturized Systems for Chemistry and Life Sciences(μ TAS2010)*, 716-718, 2010.

Invited Talks

1. Kenji YASUDA, Tomoyuki KANEKO, Fumimasa NOMURA, Atsushi SUGIYAMA. On-Chip Pre-Clinical Cardiac Toxicity: Testing Compounds Beyond hERG and QT using hES/hiPS Cardiomyocyte Cell Network Re-Entry Model on a Chip. 2nd INTERNATIONAL CONFERENCE ON DRUG DISCOVERY & THERAPY, Dubai,UAE, Feb. 2010.
2. Hyonchol Kim, Hiroyuki Takei, Kenji Yasuda. Production of Size-Controlled Nanoscopic Cap-Shaped Metal Shell Probes for Non-Amplified Quantitative Single -Cell Genome/Proteome Measurement. Particle 2010, Orlando, USA, May 2010.
3. Kenji Yasuda. Fast Cell Identification Using On-Chip Technologies for Cancer Research, Diagnosis, and Therapy. BIT's 3rd Annual World Cancer Congress 2010Theme: Health Sciences without Borders, Singapore, June 2010.
4. Kenji Yasuda. Image Cytometry. The 23rd Annual and International Meeting of the Japanese Association for Animal Cell Technology (JAACT2010), Sapporo, Japan, Sep. 2010.
5. Kenji Yasuda. Development of in vitro drug-screening system exploiting human iPS cells and other pluripotent stem cells. NEDO-OSEO Workshop: Industrial application of iPS Cells, Paris, France, Nov. 2010.
6. Kenji Yasuda. Frontier of single-cell-based on-chip screening assay: from single-cell-based purification to single-cell genome/proteome analysis. NEDO-OSEO Workshop: Industrial application of iPS Cells, Paris, France, Nov. 2010.
7. Kenji Yasuda. Development of in vitro drug-screening system exploiting human iPS cells and other pluripotent stem cells. The Swiss-Japanese Meeting on Industrial Use of iPS, Basel, Switzerland, Nov. 2010.

Meetings

1. Fumimasa Nomura, Tetsuo Kitamura, Tomoyuki Kaneko, Kenji Yasuda. Development Of Novel System For The Functional Analysis Of The Cardiomyocytes Network Model Using On-Chip Cellomics Technology. Biophysical Society 54th Annual Meeting, San Francisco, USA, Feb. 2010.
2. Yuki Tomoe, Tomoyuki Kaneko, Fumimasa Nomura, Kenji Yasuda. Community Effect To The External Electrical Stimulation On Cardiomyocytes By Using On-Chip MEA System. Biophysical Society 54th Annual Meeting, San Francisco, USA, Feb. 2010.
3. Sachie Ohhara, Fumimasa Nomura, Tomoyuki Kaneko, Kenji Yasuda. Community Effect On Drug Sensitivity Of Cardiomyocytes Controlled Spatial Patterns By Using On-Chip MEA System. Biophysical Society 54th Annual Meeting, San Francisco, USA, Feb. 2010.
4. Hideyuki Terazono, Hiroyuki Takei, Masahito Hayashi, Akihiro Hattori, Kenji Yasuda. Development of an integrated system for rapid detection of biological agents. SPIE Defense, Security, and Sensing 2010, Orlando, USA, April 2010.
5. Hideyuki Terazono, Hiroyuki Takei, Akihiro Hattori, Kenji Yasuda. Development of a high-speed real-time PCR system for rapid and precise nucleotide recognition. SPIE Defense, Security, and Sensing 2010, Orlando, USA, April 2010.
6. Tetsuo Kitamura, Fumimasa Nomura, Tomoyuki Kaneko, Peter Sartipy, Keiichi Fukuda, Atsushi Sugiyama, Masaru Sekijima, Kenji Yasuda. In vitro preclinical cardiac safety pharmacology: Development of drug proarrhythmic measurement with human embryonic stem cell derived cardiomyocytes network. WorldPharma2010, 16th World Congress on Basic and Clinical Pharmacology, Copenhagen, Denmark, July 2010.
7. Atsushi Sugiyama, Tetsuo Kitamura, Fumimasa Nomura, Tomoyuki Kaneko, Peter Sartipy, Keiichi Fukuda, Kenji Yasuda. Analysis of proarrhythmic effects of typical IKr blockers using human ES/iPS cell-derived cardiomyocytes. WorldPharma2010, 16th World Congress on Basic and Clinical Pharmacology, Copenhagen, Denmark, July 2010.
8. Hyonchol Kim, Hiroyuki Takei, Kenji Yasuda. Challenge for simultaneous detection of a lot of biomolecules with high spatial resolution using metal nano-particle label set and field emission scanning electron microscopy. 5th International Symposium on Practical Surface Analysis, Gyeongju, Korea, Oct. 2010.
9. Kenji Yasuda, Tomoyuki Kaneko, Fumimasa Nomura. On-Chip Pre-Clinical Cardiac Toxicity: Testing Compounds Beyond hERG and QT Using hES/hiPS Cardiomyocyte Re-Entry Cell Network Model On A Chip. The 14th International Conference on Miniaturized Systems for Chemistry and Life Sciences (μ TAS2010), Groningen, The Netherlands, Oct. 2010.
10. Hyonchol Kim, Masahito Hayashi, Hiroyuki Terazono, Hiroyuki Takei, Kenji Yasuda. Application of void cap-shaped metal nano-shells as artificial nano-space for biomolecular reactions. 22nd International Microprocesses and Nanotechnology Conference (MNC2010), Kokura, Japan, Nov. 2010.
11. Masahito Hayashi, Kenji Yasuda. Continuous Concentration and Separation of Microparticles Depend on Dielectric

- Constant by using Dielectrophoretic Force in a V-shaped electrode Array. 22nd International Microprocesses and Nanotechnology Conference (MNC2010), Kokura, Japan, Nov. 2010.
12. Hiroyuki Terazono, Masahito Hayashi, Hyonchol Kim, Akihiro Hattori, Kenji Yasuda. On-Chip Multichannel Extracellular Potential Monitoring System for Measurement of Hysteresis of Neural Network Activity By Electrical Stimulation. 22nd International Microprocesses and Nanotechnology Conference (MNC2010), Kokura, Japan, Nov. 2010.
 13. Akihiro Hattori, Masahito Hayashi, Kenji Yasuda. Image Recognition based Cell Sorting Device with Cultivation Chamber. 22nd International Microprocesses and Nanotechnology Conference (MNC2010), Kokura, Japan, Nov. 2010.
 14. Hyonchol Kim, Hideyuki Terazono, Masahito Hayashi, Hiroyuki Takei, Kenji Yasuda. Simultaneous Labeling of Target Biomolecules using Various Metal Nano-Shell Labels. The American Society for Cell Biology 50th Annual Meeting, Philadelphia, USA, Dec. 2010.
 15. Tomoyuki Kaneko, Fumimasa Nomura, Yuki Tomoe, Kenji Yasuda. Entrainment of the beating rhythms of cardiomyocyte network with external electric stimulation. The American Society for Cell Biology 50th Annual Meeting, Philadelphia, USA, Dec. 2010.
 16. Hideyuki Terazono, Yu Anzai, Masahito Hayashi, Hyonchol Kim, Kenji Yasuda. Reversible Cell Labeling Exploiting Fluorescent Aptamer and Nuclease Digestion. The American Society for Cell Biology 50th Annual Meeting, Philadelphia, USA, Dec. 2010.