

Organic Biomaterials

1. Staffs and Students (April, 2009)

Professor	Kazunari AKIYOSHI	
Associate Professor	Yoshihiro SASAKI	
Assistant Professor	Akihiko WATANABE,	Shinichi SAWADA
Secretary	Nanae NISHI	
Graduate Student	Tai HIRAKURA,	Yuki MORITANI,
	Sayaka TOITA,	Koki KAMIYA,
	Asako SHIMODA,	Haruko TAKAHASHI,
	Yurina SEKINE,	Takashi NAKAI,
	Junichi YASUOKA,	Yuji TSUCHIDO,
	Aya NAKAJIMA,	Keita ABE

2. Purpose of Education

Courses: Biomaterials, Advanced Medical Materials, Advanced Organic Materials

3. Research Subjects

- 1) Nanogel engineering for drug delivery system and tissue engineering
- 2) Chaperoning engineering for control of function of biomacromolecules
- 3) Liposome and membrane protein engineering towards *de novo* cell
- 4) Development of hybrid biomaterials

4. Publications

Original Article

1. Inomoto N, Osaka N, Suzuki T, Hasegawa U, Ozawa Y, Endo H, Akiyoshi K, Shibayama M, Interaction of Nanogel with Cyclodextrin or Protein: Study by Dynamic Light Scattering and Small-angle Neutron Scattering. *Polymer* 50:541-546, 2009.
2. Yamane S, Sugawara A, Watanabe A, Akiyoshi K, Hybrid Nanoapatite by Polysaccharide Nanogel-Templated Mineralization, *J. Bioact. Compat. Polym.* 24:129-150, 2009.
3. Yamane S, Sugawara A, Sasaki Y, Akiyoshi K, Nanogel-Calcium Phosphate Hybrid Nanoparticles with Negative or Positive Charges for Potential Biomedical Applications. *Bull. Chem. Soc. Jpn.* 82:416-418, 2009.
4. Morimoto N, Ogino N, Narita T, Akiyoshi K, Enzyme-responsive artificial chaperone system with amphiphilic amylose primer. *J. Biotechnol.* 140:246-249, 2009.
5. Mukai M, Maruo K, Kikuchi J, Sasaki Y, Hiyama S, Moritani Y, Suda T. Propagation and amplification of molecular information using a photo- responsive molecular switch. *Supramol. Chem.* 50:541, 2009.
6. Alles N, Soysa NS, Mian AH, Tomomatsu N, Saito H, Baron R, Morimoto N, Aoki K, Akiyoshi K, Ohya K, Polysaccharide nanogel delivery of a TNF- α and RANKL antagonist peptide allows systemic prevention of bone loss. *Eur. J. Pharm. Sci.* 37:83-88, 2009.
7. Miyai K, Yoneda M, Hasegawa U, Toita S, Izu Y, Hemmi H, Hayata T, Ezura Y, Mizutani S, Miyazono K, Akiyoshi K, Yamamoto T, Noda M, ANA deficiency enhances BMP-induced ectopic bone formation via transcriptional events. *J. Biol. Chem.* 284:10593-10600, 2009.
8. Morimoto N, Obeid R, Yamane S, Winnik FM, Akiyoshi K, Composite Nanomaterials by Self-assembly and Controlled Crystallization of Poly(2-isopropyl-2-oxazoline)-Grafted Polysaccharide. *Soft Matter.* 5:1597-1600, 2009.
9. Morimoto N, Tamada J, Sawada S, Shimada N, Kano A, Maruyama A, Akiyoshi K, Interaction of Self-assembled Cationic Nanogels with Oligo-DNA and Function as Artificial Nucleic Acid Chaperone. *Chem. Lett.* 38:496-497, 2009.
10. Kaneda M, Nomura SM, Ichinose S, Kondo S, Nakahama K, Akiyoshi K, Morita I, Direct formation of proteo-liposomes by in vitro synthesis and cellular cytosolic delivery with connexin-expressing liposomes. *Biomaterials.* 30:3971-3977, 2009.
11. Ozawa Y, Sawada S, Morimoto N, Akiyoshi K, Self-assembled nanogel of hydrophobized dendritic dextrin for protein delivery. *Macromol. Biosci.* 9:694-701, 2009.
12. Hayashi C, Hasegawa U, Saita Y, Hemmi H, Hayata T, Nakashima K, Ezura Y, Amagasa T, Akiyoshi K, Noda M, Osteoblastic bone formation is induced by using nanogel-crosslinking hydrogel as novel scaffold for bone growth

- factor. *J. Cell. Physiol.* 220:1-7, 2009.
13. Chu MX, Kudo H, Shirai T, Miyajima K, Saito H, Morimoto N, Yano K, Iwasaki Y, Akiyoshi K, Mitsubayashi K, A soft and flexible biosensor using a phospholipid polymer for continuous glucose monitoring. *Biomed. Microdevices.* 11:837-842, 2009.
 14. Boridy S, Takahashi H, Akiyoshi K, Maysinger D, The binding of pullulan modified cholesteryl nanogels to $A\beta$ oligomers and their suppression of cytotoxicity. *Biomaterials.* 30:5583-5591, 2009.
 15. Kobayashi H, Katakura O, Morimoto N, Akiyoshi K, Kasugai S, Effects of cholesterol-bearing pullulan (CHP)-nanogels in combination with prostaglandin E1 on wound healing. *J. Biomed. Mater. Res. Part B.* 91:55-60, 2009.
 16. Toita S, Soma Y, Morimoto N, Akiyoshi K, Cycloamylose-based Biomaterial: Nanogels of Cholesterol-bearing Cationic Cycloamylose for siRNA Delivery. *Chem. Lett.* 38:1114-1115, 2009.
 17. Tsutsumi H, Nomura W, Abe S, Mino T, Masuda A, Ohashi N, Tanaka T, Ohba K, Yamamoto N, Akiyoshi K, Tamamura H, Fluorogenically Active Leucine Zipper Peptides as New Tag-Probe Pairs for Protein Imaging in Living Cells. *Angew. Chem.-Int. Edit.* 48:9164-9166, 2009.
 18. Hasegawa U, Sawada S, Shimizu T, Kishida T, Otsuji E, Mazda O, Akiyoshi K, Raspberry-like assembly of cross-linked nanogels for protein delivery. *J. Control. Release.* 140:312-317, 2009.