

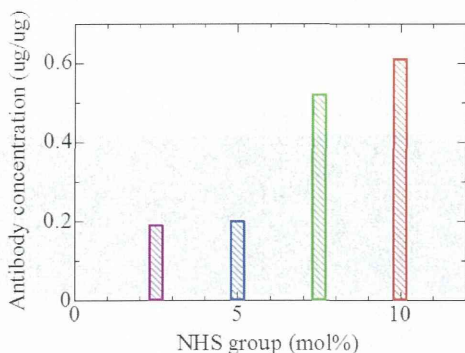
ーム表面のみに導入することは、粒径を小さくする上で重要であると言える。

③scFv修飾NIR蛍光リポソームの物性

様々なNHS基提示率でNIR蛍光リポソームに対してscFvを反応させた後の粒径変化を動的光散乱法で測定した(表1)。その結果、すべてのNIR蛍

表1. scFv修飾NIR蛍光イメージングの平均粒径

NHS (mol%)	Before (nm)	After (nm)
2.5	205±90	215±120
5.0	205±70	200±70
7.5	200±90	200±80
10	205±65	210±75



光図5)リポソームの表面にscFv抗体修飾を介してリポソーム同士が架橋してしまった結果測定される大幅な粒子径の増大は観測されなかった。

次に、リポソーム表面への抗体修飾量を評価したところ、NHS提示率が増加する程、scFvの修飾量も増加しており(図5)、NHS提示率を変化させることによって抗体の修飾量を変化させ得ることが分かった。

④scFv修飾NIR蛍光リポソームの細胞特異性と近赤外イメージング

scFv修飾NIR蛍光リポソームの細胞特異性を評価するために、EGFR陽性A431細胞とEGFR陰性CTLL2細胞を対象として、フローサイトメトリーを用いてリポソームの結合評価を行った(図6)。その結果、すべてのscFv修飾NIR蛍光リポソームは、A431細胞にのみ結合し、さらにNHS提示率が高い(scFv修飾量が高い)ほど、その結合性を強いことが示された。

次に、赤外蛍光顕微鏡を用いて、scFv修飾NIR蛍光リポソームの細胞特異性を評価した(図7)。その結果、EGFR陽性A431細胞に対して、scFv非修飾NIR蛍光リポソームはほとんど細胞表面に存在していなかったが、scFvを修飾したNIR蛍光リポソームを用いた場合、多くの細胞表面にRE-Y₂O₃由来の蛍光が観測された。一方、EGFR陰性CTLL2細胞に対しては、scFv修飾・非修飾に関わらず、RE-Y₂O₃由来の蛍光はほとんど観測されなかった。これから、EGFR陽性材料棒特異的に吸着するNIR蛍光リポソームが作製できたといえ、さらに、近赤外イメージングにも用いることができるということが分かった。

さらに、マイクロカプセル化法により、カチオン性NIR蛍光リポソームを添加したHeLa細胞及びHuh-7細胞のNIR蛍光イメージングを行った。カチオン性NIR蛍光リポソームを添加したそれぞれの細胞は、7日経過後においてもNIR発光が確認できた。また、

時間経過に伴って細胞一つ当たりの NIR 発光強度が減少することがわかった。これは時間経過に伴う細胞分裂

の過程で、細胞一つ当たり導入されている RE-Y₂O₃ もそれぞれの細胞

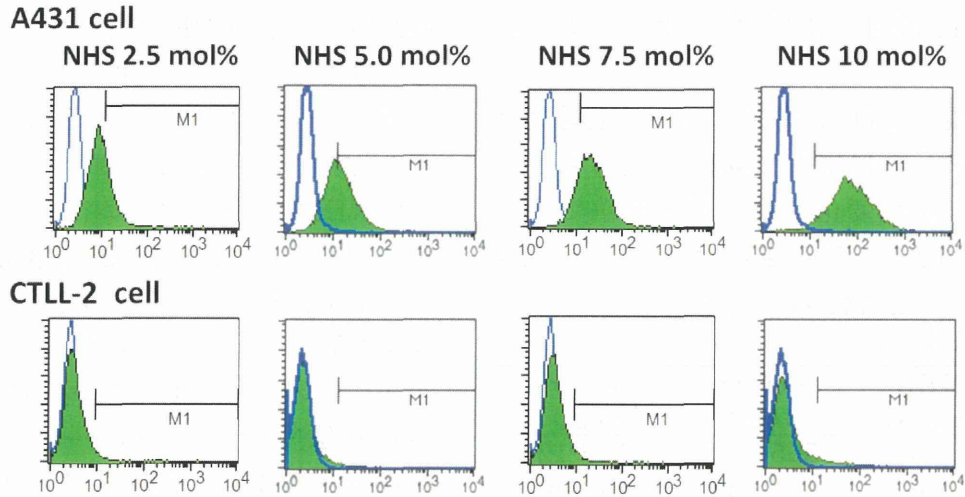


図 6. 細胞に結合した scFv 修飾 NIR 蛍光リポソームの検出抗体による蛍光強度

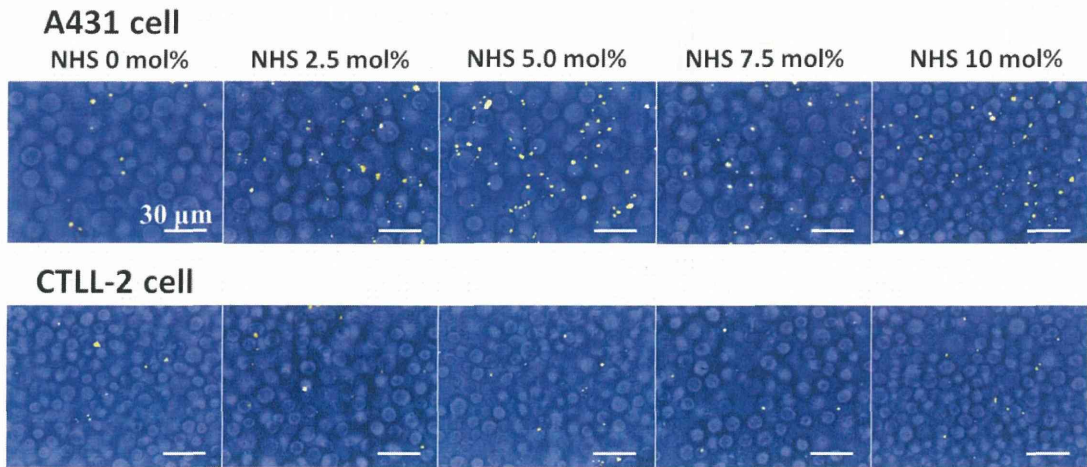


図 7. 細胞に結合した scFv 修飾 NIR 蛍光リポソームの NIR 蛍光像

に分配されていくためであると考えられる。したがって、リポフェクションにより細胞内部に RE-Y₂O₃ が導入できたことがわかった。

⑤胆がんマウスを用いた近赤外イメージング

次に、A431細胞を用いて腫瘍を形成させた胆がんマウスに対する scFv 修飾 NIR 蛍光リポソームの特異性評

価を行った。その結果、多くの RE-Y₂O₃が肺へ集積してしまい、マウスにある状態では腫瘍へのRE-Y₂O₃の集積はうまく観測されなかった。そこで、腫瘍を取り出して観測したところ、わずかながら、RE-Y₂O₃由来の蛍光を観測することができた。

D. 考察

マイクロカプセル化法によりPEGを導入したリポソームを作製した。その結果、PEGが導入され、かつ内部にナノ粒子を導入したリポソームの作製に成功した。そこで、次に、リポソーム表面への抗体提示を目指し、リポソーム作製方法および抗体接合方法の検討を行った。その結果、DSPE-PEG₂₀₀₀-NHSをリポソーム外面にのみに導入することを目指し、DSPE-PEG₂₀₀₀-NHSを他のリン脂質のようにクロロホルムに溶解させず、リン脂質二重層の外側の層を作製する際の水溶液中に溶解させることによってリポソームを作製し、その後h528 scFvと反応させる手順により、抗体提示リポソームを作製した場合、粒径を小さなリポソームを作製することに成功した。そして、NHS提示率を制御することによって、リポソーム間を会合させずに、かつ、scFvの導入量を変化させることに成功した。この

scFv修飾 NIR 蛍光リポソームはEGFR陽性細胞に選択的に結合し、かつ、リポソームの帯電状況を変化させることによって、細胞内へRE-Y₂O₃を導入することにも成功した。

今回は、マウスに投与した際は、肺への集積が確認され、腫瘍領域までに運搬されたRE-Y₂O₃量は少なかったが、今後、血中でのリポソームの安定性を向上する構造設計を行うことによって、より多くのRE-Y₂O₃を腫瘍へ運搬できる期待される。

E. 結論

赤色・NIR 蛍光リポソームに scFv を修飾することで、非特異性を抑制しつつ、標的特異性を付与することに成功した。

研究成果の刊行に関する一覧表

書籍

著者氏名	論文タイトル名	書籍全体の編集者名	書籍名	出版社名	出版地	出版年	ページ
佐々木良平、丹生健一（共同編集）、鈴木志津枝ー（編集アドバイザー）、佐々木良平、西村英輝、吉田賢史、宮脇大輔、他共同執筆		佐々木良平、丹生健一	カラーアトラス放射線療法・放射線化学療法有害反応と看護ケア	日本看護協会出版	東京	2011	
[分担執筆] 佐々木良平、宮脇大輔	下垂体腫瘍	監修：唐澤克之他	タイトル：がん放射線療法・2010	篠原出版	東京	2010	625-632
[分担執筆] 佐々木良平、宮脇大輔	別冊 下垂体腫瘍	監修：唐澤克之他	タイトル：がん放射線療法・2010	篠原出版	東京	2010	18-19
[分担執筆] 佐々木良平	放射線療法	監修：丹生健一他	耳鼻咽喉科・診断と治療社 修ノート	東京	東京	2010	434-438
沼子千弥ほか		日本放射光学会	放射光が解き明かす驚異のナノ世界	講談社	日本	2011	111-114
沼子千弥 ほか		横山正孝	ヨウ素の化学と最新応用技術	CMC出版	日本	2011	39-44

雑誌

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
Matsui, K., Karasaki, M., Segawa, M., Hwang, S. Y., Tanaka, T., Ogino, C., Kondo, A	Biofunctional TiO ₂ nanoparticle mediated photokilling of cancer cells using UV irradiation	<i>MedChemComm</i>	1	209-211	2010
Miyachi, Y., Shimizu, N., Ogino, C., Kondo, A	Selection of DNA aptamers using atomic force microscopy	<i>Nucleic Acids Research</i>	38	e21	2010
Fukuda, N., Ishii, J., Tanaka, T., Kondo, A	The competitor-introduced Gyrecruitment system, a new approach for screening affinity-enhanced proteins	<i>FEBS Journal</i>	277	1704-1712	2010

<u>Kondo, A.</u>	Protein-protein interactions and selection	<i>FEBS Journal</i>	277	1981	2010
Ishii, J., Fukuda, N., <u>Tanaka, T., Ogino, C., Kondo, A</u>	Protein-protein interactions and selection: yeast-based approaches that exploit guanine nucleotide-binding protein signaling	<i>FEBS Journal</i>	277	1982-1995	2010
Shimizu, N., Ninomiya, K., <u>Ogino, C.</u> , M. M. Rahman	Potential uses of titanium dioxide in conjunction with ultrasound for improved disinfection	<i>Biochemical Engineering Journal</i>	48	416	2010
<u>Ogino, C.</u> , Shibata, N., Sasai, R., Takaki, K., Miyachi, Y., Kuroda, S., Ninomiya, K., Shimizu, N	Construction of protein-modified TiO ₂ nanoparticles for use with ultrasound irradiation in a novel cell-injuring method	<i>Bioorganic & Medicinal Chemistry Letters</i>	20	5320-5325	2010
Shishido, T., Mieda, H., Hwang, S. Y., Nishimura, Y., <u>Tanaka, T., Ogino, C., Fukuda, H., Kondo, A</u>	Affibody-displaying bionanocapsules for specific drug delivery to HER2 expressing cancer cells	<i>Bioorganic & Medicinal Chemistry Letters</i>	20	5726-5731	2010
Nagaoka, H., ato, Y., Xie, X., Hata, H., Eguchi, M., Sakurai, N., Watanabe, T., Saitoh, H., <u>Kondo, A.</u> , Sugita, S., Ohnishi, N.	Coupling stimuli-responsive magnetic nanoparticles with antibody-antigen detection in immunoassays	<i>Analytical Chemistry</i>	83	9197-9200	2011
Fukuda, N., Ishii, J., <u>Kondo, A</u>	G γ recruitment system incorporating a novel signal amplification circuit to screen transient protein-protein interactions	<i>FEBS Journal</i>	278	3086-3094	2011
Fukuda, N., Ishii, J., Kaishima, M., <u>Kondo, A.</u>	Amplification of agonist stimulation of human G-protein-coupled receptor signaling in yeast	<i>Analytical Biochemistry</i>	417	182-187	2011
Hiraiwa, K., Ueda, M., Takeuchi, H., Oyama, T., Irino, T., Yoshikawa, T., <u>Kondo, A.</u> , Kitagawa, Y.	Sentinel node mapping with thermoresponsive magnetic nanoparticles in rats	<i>Journal of Surgical Research</i>	174	48-55	2012
Nishimura, Y., Shishido, T., Ishii, J., <u>Tanaka, T., Ogino, C., Kondo, A.</u>	Protein-encapsulated bio-nanocapsules production with ER membrane localization sequences	<i>Journal of Biotechnology</i>	157 (1)	124-129	2012
Ninomiya, K., <u>Ogino, C.</u> , Oshima, S., Sonoke, S., Kuroda, S., Shimizu, N.	Targeted sonodynamic therapy using protein-modified TiO ₂ nanoparticles	<i>Ultrasonics Sonochemistry</i>	19(3)	607-614	2012

Nishimura, Y., Ishii, J., Okazaki, F., <u>Ogino, C.</u> , <u>Kondo, A.</u>	Complex carriers of affibody-displaying bio-nanocapsules and composition-varied liposomes for HER2-expressing breast cancer cell-specific protein delivery	<i>Journal of Drug Targeting</i>	20(10)	897-905	2012
Nishimura, Y., Mimura, W., Fahimuddin, I., Amino, T., Ishii, J., <u>Ogino C.</u> , <u>Kondo, A.</u>	Granting specificity for breast cancer cells using a Hepatitis B core particle with a HER2-targeted affibody molecule	<i>Journal of Biochemistry</i>	153(3)	251-256	2013
Nishimura, Y., Takeda, K., Ishii, J., <u>Ogino, C.</u> , <u>Kondo, A.</u>	An affinity chromatography method used to purify His-tag-displaying bio-nanocapsules	<i>Journal of Virological Methods</i>	189(2)	393-396	2013
Ninomiya, K., Aikawa, M., <u>Ogino, C.</u> , Shimizu, N.	Inactivation of Escherichia coli by sonoelectrocatalytic disinfection using TiO ₂ as electrode	<i>Ultrasonics Sonochemistry</i>	20(2)	762-767	2013
Ninomiya, K., Kaneda, K., Kawashima, S., Miyachi, Y., <u>Ogino, C.</u> , <u>Shimizu, N.</u>	Cell-SELEX based selection and characterization of DNA aptamer recognizing human hepatocarcinoma	<i>Bioorganic & Medicinal Chemistry</i>	23(6)	1797-1802	2013
Srivastava, S.K., Yamada, R., <u>Ogino, C.</u> , <u>Kondo, A.</u>	Sidewall modification of multiwalled carbon nanotubes by Allium sativum (garlic) and its effect on the deposition of gold nanoparticles	<i>Carbon</i>	56	309-316	2013
Srivastava, S.K., Yamada, R., <u>Ogino, C.</u> , <u>Kondo, A.</u>	Biogenic synthesis and characterization of gold nanoparticles by Escherichia coli K12 and its heterogeneous catalysis in degradation of 4-nitrophenol	<i>Nanoscale Research Letter</i>	8(1)	70	2013
Mukubou H, Tujimura T, <u>Sasaki R</u> , Yonson Ku,	The role of autophagy in the treatment of pancreatic cancer with gemcitabine and ionizing radiation.	<i>International Journal of Oncology</i>	37	821-828	2010
Amalia H, <u>Sasaki R</u> , Suzuki Y, Demizu Y, Bito T, Nishimura H, Okamoto Y, Yoshida K, Miyawaki D, Kawabe T, Mizushina Y, and Kazuro S	Vitamin K ₂ -derived Compounds Induce Growth Inhibition in Radioresistant Cancer Cells	<i>Kobe J Med Sci</i>	56	38-49	2010

Kumamoto-Yonezawa, Y., <u>Sasaki, R.</u> , Suzuki, Y., Matsui, Y., Hada, T., Uryu, K., Sugimura, K., Yoshida, H., Mizushina, Y.	Enhancement of human cancer cell radiosensitivity by conjugated eicosapentaenoic acid - a mammalian DNA polymerase inhibitor	<i>International Journal of Oncology</i>	36	577-584	2010
Yoshida, K., <u>Sasaki, R.</u> , Nishimura, H., Okamoto, Y., Suzuki, Y., Saitoh, M., Otsuki, N., Hayashi, Y., Soejima, T., Nibu, K., Sugimura, K.	Nuclear Factor-kappa B Expression as a Novel Marker of Radioresistance: In Early Stage Laryngeal	<i>Cancer, Head Neck</i>	32	646-655	2010
<u>佐々木良平</u>	PET診断と放射線治療	<i>PET Journal</i>	10	13-15	2010
<u>佐々木良平</u> , 橋本直樹, 赤坂浩亮	放射線治療の有害事象	プロフェッショナルがんナーシング	1	63-73	2011
<u>佐々木良平</u> , 西村英輝, 椋本成俊	がん放射線治療の基礎知識	プロフェッショナルがんナーシング	1	42-55	2011
Yoshida K, <u>Sasaki R.</u> , Nishimura H, Miyawaki D, Kawabe T, Okamoto Y, Nakabayashi K, Yoshida S, Sugimura K	Radiotherapy for Japanese elderly patients with cervical cancer: preliminary survival outcomes and evaluation of treatment-related toxicity	<i>Arch Gynecol Obstet</i>		in press	2011
Wakahashi K, Shimoyama M, Katayama Y, Minagawa K, Yoshida K, <u>Sasaki R.</u> , Nakayama S, Yokozaki H, Yanagita E, Itoh T, Hayashi Y, Matsui T	Histiocytic sarcoma with two immunohistopathologically distinct populations	<i>Int J Hematol</i>		in press	2011
Ikushima H, Dong L, Erasmus J, Allen P, McAleer MF, Zhuang Y, <u>Sasaki R.</u> , Komaki R.	Predictive Value of (18)F-Fluorodeoxyglucose Uptake by Positron Emission Tomography for Non-Small Cell Lung Cancer Patients Treated with Radical Radiotherapy.	<i>J Radiat Res.</i>		in press	2011
Hashimoto N, <u>Sasaki R.</u> , Nishimura H, Yoshida K, Miyawaki D, Nakayama M, Uehara K, Okamoto Y, Ejima Y, Azumi A, Matsui T, Sugimura K	Long-term outcome and patterns of failure in primary ocular adnexal mucosa-associated lymphoid tissue lymphoma treated with radiotherapy	<i>Int J Radiat Oncol Biol Phys.</i>	82	1509-14	2011

Komatsu S, Fukumoto T, Demizu Y, Miyawaki D, Terashima K, Niwa Y, Mima M, Fujii O, <u>Sasaki R</u> , Yamada I, Hori Y, Hishikawa Y, Abe M, Ku Y, Murakami M	The effectiveness of particle radiotherapy for hepatocellular carcinoma associated with inferior vena cava tumor thrombus	<i>J Gastroenterol</i>	46	913-20	2011
Komatsu S, Fukumoto T, Demizu Y, Miyawaki D, Terashima K, <u>Sasaki R</u> , Hori Y, Hishikawa Y, Ku Y, Murakami M	Clinical results and risk factors of proton and carbon ion therapy for hepatocellular carcinoma	<i>Cancer</i>	117	4890-904	2011
<u>Sasaki R</u> , Yasuda K, Abe E, Uchida N, Kawashima M, Uno T, Fujiwara M, Shioyama Y, Kagami Y, Shibamoto Y, Nakata K, Takada Y, Kawabe T, Uehara K, Nibu K, Yamada S	Multi-institutional analysis of solitary extramedullary plasmacytoma of the head and neck treated with curative radiotherapy	<i>Int J Radiat Oncol Biol Phys.</i>	82	626-34	2011
Yoshida K, <u>Sasaki R</u> , Nishimura H, Miyawaki D, Kawabe T, Okamoto Y, Nakabayashi K, Yoshida S, Sugimura K	Radiotherapy for Japanese elderly patients with cervical cancer: preliminary survival outcomes and evaluation of treatment-related toxicity	<i>Arch Gynecol Obstet.</i>	284	1007-14	2011
Ishihara T, Yoden E, Konishi K, Nagase N, Yoshida K, Kurebayashi J, Sonoo H, Murashima N, <u>Sasaki R</u> , Hiratsuka J	Long-term outcome of hypofractionated radiotherapy to the whole breast of Japanese women after breast-conserving surgery	<i>Breast Cancer</i>	22		2012
Terashima K, Demizu Y, Hashimoto N, Jin D, Mima M, Fujii O, Niwa Y, Takatori K, Kitajima N, Sirakawa S, Yonson K, Hishikawa Y, Abe M, <u>Sasaki R</u> , Sugimura K, Murakami M	A phase I/II study of gemcitabine-concurrent proton radiotherapy for locally advanced pancreatic cancer without distant metastasis	<i>Radiother Oncol.</i>	103	25-31	2012

Soejima T, Yoden E, Nishimura Y, Ono S, Yoshida A, Fukuda H, Fukuhara N, <u>Sasaki R</u> , Tsujino K, Norihisa Y	Radiation therapy in patients with implanted cardiac pacemakers and implantable cardioverter defibrillators: a prospective survey in Japan	<i>J Radiat Res.</i>	52	516-21	2011
Nishimura H, <u>Sasaki R</u> , Yoshida K, Miyawaki D, Okamoto Y, Kiyota N, Saito M, Otsuki N, Nibu KI.	Radiotherapy for Stage I or II hypopharyngeal carcinoma	<i>J Radiat Res.</i>	53(6)	892-9	2012
Tamaki Y, <u>Sasaki R</u> , Ejima Y, Ogura M, Negoro Y, Nakajima T, Murakami M, Kaji Y, Sugimura K.	Efficacy of intraoperative radiotherapy targeted to the abdominal lymph node area in patients with esophageal carcinoma	<i>J Radiat Res.</i>	53(6)	882-91	2012
Uehara K, Sasayama T, Miyawaki D, Nishimura H, Yoshida K, Okamoto Y, Mukumoto N, Akasaka H, Nishihara M, Fujii O, Soejima T, Sugimura K, Kohmura E, <u>Sasaki R</u> .	Patterns of failure after multimodal treatments for high-grade glioma: effectiveness of MIB-1 labeling index	<i>Radiat Oncol.</i>	7	104	2012
Ishihara T, Yoden E, Konishi K, Nagase N, Yoshida K, Kurebayashi J, Sonoo H, Murashima N, <u>Sasaki R</u> , Hiratsuka J.	Long-term outcome of hypofractionated radiotherapy to the whole breast of Japanese women after breast-conserving surgery	<i>Breast Cancer.</i>	DOI 10.1007/s12282-012-0345-2		2012
Terashima K, Demizu Y, Hashimoto N, Jin D, Mima M, Fujii O, Niwa Y, Takatori K, Kitajima N, Sirakawa S, Yonson K, Hishikawa Y, Abe M, <u>Sasaki R</u> , Sugimura K, Murakami M.	A phase I/II study of gemcitabine-concurrent proton radiotherapy for locally advanced pancreatic cancer without distant metastasis	<i>Radiother Oncol.</i>	103 (1)	25-31	2012
Hashimoto N, <u>Sasaki R</u> , Nishimura H, Yoshida K, Miyawaki D, Nakayama M, Uehara K, Okamoto Y, Ejima Y, Azumi A, Matsui T, Sugimura K.	Long-term Outcome and Patterns of Failure in Primary Ocular Adnexal MALT Lymphoma Treated with Radiotherapy.	<i>Int. J Radiat Oncol Biol Phys</i>	82 (4)	1509-14	2012
<u>Sasaki R</u> , Yasuda K, Abe E, Uchida N, Kawashima M, Uno T, Fujiwara M, Shioyama Y, Kagami Y, Shibamoto Y, Nakata	Multi-institutional Analysis of Solitary Extramedullary Plasmacytoma of the Head and Neck Treated with Curative Radiotherapy	<i>Int J Radiat Oncol Biol Phys,</i>	82 (2)	626-34	2012

K, Takada Y, Kawabe T, Uehara K, Nibu K, Yamada S.					
Iwata H, Demizu Y, Fujii O, Terashima K, Mima M, Niwa Y, Hashimoto N, Akagi T, <u>Sasaki R</u> , Hishikawa Y, Abe M, Shibamoto Y, Murakami M, Fuwa N.	Long-Term Outcome of Proton Therapy and Carbon-Ion Therapy for Large (T2a-T2bN0M0) Non-Small-Cell Lung Cancer	<i>J Thorac Oncol.</i>	8(6)	726-735	2013
Akasaka H, <u>Sasaki R</u> , Yoshida K, Takayama I, Yamaguchi T, Yoshida H, Mizushima Y.	Monogalactosyl diacylglycerol, a replicative DNA polymerase inhibitor, from spinach enhances the anti-cell proliferation effect of gemcitabine in human pancreatic cancer cells	<i>Biochim Biophys Acta.</i>	1830	2517-2525	2013
D. Rangappa, T. Naka, <u>S. Ohara</u> , and T. Adschiri	Preparation of Ba-Hexaferrite Nanocrystals by an Organic Ligand-Assisted Supercritical Water Process	<i>Crystal Growth & Design</i>	10	11-15	2010
T. Mousavand, <u>S. Ohara</u> , T. Naka, M. Umetsu, S. Takami, and T. Adschiri	Organic-Ligand-Assisted Hydrothermal Synthesis of Ultrafine and Hydrophobic ZnO Nanoparticles	<i>J. Mater. Res.</i>	25	219-223	2010
K. Sato, H. Abe, and <u>S. Ohara</u>	Selective Growth of Monoclinic and Tetragonal Zirconia Nanocrystals	<i>J. Am. Chem. Soc.</i>	132	2538-2539	2010
T. Sasaki, <u>S. Ohara</u> , T. Naka, J. Vejpravova, V. Sechovsky, <u>M. Umetsu</u> , <u>S. Takami</u> , B. Jeyadevan, and T. Adschiri	Continuous Synthesis of Fine MgFe ₂ O ₄ Nanoparticles by Supercritical Hydrothermal Reaction	<i>J. Supercrit. Fluids</i>	53	92-94	2010
Z. Tan, H. Abe, M. Naito, and <u>S. Ohara</u>	Arrangement of Palladium Nanoparticles Templated by Supramolecular Self-assembly of SDS Wrapped on Single-Walled Carbon Nanotubes	<i>Chem. Comm.</i>	46	4363-4365	2010
Z. Tan, H. Abe, M. Naito, and <u>S. Ohara</u>	Oriented Growth Behavior of Ag Nanoparticles using SDS as a Shape Director	<i>J. Colloid Interface Sci.</i>	348	289-292	2010
J. Zhang, H. Kumagai, K. Yamamura, <u>S. Ohara</u> , <u>S. Takami</u> , A. Morikawa, H. Shinjoh, K. Kaneko, T. Adschiri, and A. Suda	Extra-Low Temperature Oxygen Storage Capacity of CeO ₂ Nanocrystals with Cubic Facets	<i>Nano Lett.</i>	11	361-364	2011

<u>K. Sato</u> , H. Abe, <u>S. Ohara</u>	Selective growth of Monoclinic and Tetragonal Zirconia Nanocrystals	<i>Journal of the American Chemical Society</i>	132	2538-2539	2010
<u>K. Sato</u> , T. Kinoshita, H. Abe	Performance and Durability of Nanostructured LSM/YSZ Cathode for Intermediate Temperature Solid Oxide Fuel Cells	<i>Journal of Power Sources</i>	195	4114-4118	2010
<u>K. Sato</u> , T. Kinoshita, H. Abe	Fine-microstructure Mediated Efficient Hydrogen Oxidation in Ni/YSZ Anode Fabricated from Novel Co-precipitation Derived Nanocomposites	<i>Fuel Cells</i>	10	320-324	2010
J. Zhang, T. Naka, <u>S. Ohara</u> , K. Kaneko, T. Trevethan, A. Shluger, T. Adschiri	Surface Ligand-Assisted Valence Change in Ceria Nanocrystals	<i>Phys. Rev. B</i>	84	045411-1-9	2011
Z. Tan, H. Abe, <u>S. Ohara</u>	Ordered Deposition of Pd Nanoparticles on Sodium Dodecyl Sulfate-Functionalized Single-Walled Carbon nanotubes	<i>J. Mater. Chem.</i>	21	12008-12014	2011
<u>S. Ohara</u> , Y. Hatakeyama, <u>M. Umetsu</u> , Z. Tan, T. Adschiri	Fabrication of Pd-DNA and Pd-CNT Hybrid Nanostructures for Hydrogen Sensors	<i>Advanced Powder Technology</i>	22	559-565	2011
J. Han, <u>S. Ohara</u> , <u>K. Sato</u> , H. Xu, Z. Tan, Y. Morisada, K. Kuruma, M. Naito, P. Shan, and <u>M. Umetsu</u>	Directed Assembly of Metal Oxide Nanoparticles by DNA	<i>Mater. Lett.</i>	79	78-80	2012
T. Togashi, T. Naka, S. Asahina, K. Sato, <u>S. Takami</u> , T. Adschiri	Surfactant-assisted one-pot synthesis of superparamagnetic magnetite nanoparticle clusters with tunable cluster size and magnetic field sensitivity	<i>Dalton Trans.</i>	40	1073-1078	2011
V. Singh, <u>S. Takami</u> , K. Minami, D. Hojo, T. Arita, T. Adschiri	Hybridisation of Sebaic Acid onto the Surface of gamma-Alumina Nanoparticles in Sub- and Supercritical Water	<i>Z. Naturforsch., B: Chem. Sci.</i>	65b	1045-1050	2010

T. Togashi, <u>S. Takami</u> , K. Kawakami, H. Yamamoto, T. Naka, K. Sato, K. Abe, T. Adschiri,	Continuous Hydrothermal Synthesis of 3,4-Dihydroxyhydrocinnamic Acid-Modified Magnetite Nanoparticles with Stealth-Functionality against Immunological Response	<i>J. Mater. Chem.</i>	22	9041-9045	2012
M. Taguchi, <u>S. Takami</u> , T. Adschiri, T. Nakane, K. Sato, T. Naka	Simple and rapid synthesis of ZrO ₂ nanoparticles from Zr(OEt) ₄ and Zr(OH) ₄ using a hydrothermal method	<i>Cryst. Eng. Comm.</i>	14	2117-2123	2012
M. Taguchi, <u>S. Takami</u> , T. Adschiri, T. Nakane, <u>K. Sato</u> , T. Naka	Synthesis of surface-modified monoclinic ZrO ₂ nanoparticles using supercritical water	<i>Cryst. Eng. Comm.</i>	14	2132-2138	2012
A. Sahraneshin, <u>S.</u> <u>Takami</u> , D. Hojo, K. Minami, T. Arita, T. Adschiri	Synthesis of shape-controlled organic-hybridized hafnium oxide nanoparticles under sub- and supercritical hydrothermal conditions	<i>J. Supercrit. Fluids</i>	62	190-196	2012
J. Lu, K. Minami, <u>S.</u> <u>Takami</u> , M. Shibata, Y. Kaneko, T. Adschiri	Supercritical Hydrothermal Synthesis and In Situ Organic Modification of Indium Tin Oxide Nanoparticles Using Continuous-Flow Reaction System	<i>ACS Appl. Mater. Interfaces</i>	4	351-354	2012
T. Togashi, <u>M. Umetsu</u> , T. Naka, <u>S. Ohara</u> , Y. Hatakeyama, T. Adschiri	One-pot Hydrothermal Synthesis of an Assembly of Magnetite Nanoneedles on a Scaffold of Cyclic-diphenylalanine Nanorods	<i>Journal of Nanoparticle Research</i>	13	3991-3999	2011
A. Sahraneshin, S. Asahina, T. Togashi, V. Singh, <u>S. Takami</u> , D. Hojo, T. Arita, K. Minami, T. Adschiri	Surfactant-Assisted Hydrothermal Synthesis of Water-Dispersible Hafnium Oxide Nanoparticles in Highly Alkaline Media	<i>Cryst. Growth Des.</i>	12	5219-5226	2012
A. Sahraneshin, <u>S.</u> <u>Takami</u> , D. Hojo, T. Arita, K. Minami, T. Adschiri	Mechanistic study on the synthesis of one-dimensional yttrium aluminum garnet nanostructures under supercritical hydrothermal conditions in the presence of organic amines	<i>CrystEngComm</i>	14	6085-6092	2012

B. Shahmoradi; I. A. Ibrahim; N. Sakamoto; S. Ananda; T.N. Guru Row; <u>Kohei Soga</u> ; K. Byrappa; S. Parsons; Yoshihisa Shimizu	In situ surface modification of molybdenum-doped organic-inorganic hybrid TiO ₂ nanoparticles under hydrothermal conditions and treatment of pharmaceutical effluent	<i>ENVIRONMENTAL TECHNOLOGY</i>	31	1213-1220.	2010
<u>Kohei Soga</u> , Kimikazu Tokuzen, Kosuke Tsuji, Tomoyoshi Yamano, Hiroshi Hyodo and Hidehiro Kishimoto	NIR Bioimaging: Development of Liposome-Encapsulated, Rare-Earth-Doped Y ₂ O ₃ Nanoparticles as Fluorescent Probes	<i>EUROPEAN JOURNAL OF INORGANIC CHEMISTRY</i>	2010	2673-2677.	2010
T. Zako, H. Hyodo, K. Tsuji, K. Tokuzen, H. Kishimoto, M. Ito, K. Kaneko, M. Maeda and <u>K. Soga</u>	Development of Near Infrared-Fluorescent Nanophosphors and Applications for Cancer Diagnosis and Therapy	<i>JOURNAL OF NANOMATERIALS</i>	2010	1-8	2010
<u>K. Soga</u> and Y. Nagasaki	Polyscale technology for developing near infrared fluorescence bioimaging system based on novel syntheses approaches for rare-earth doped nanophosphors	<i>MATERIALS RESEARCH INNOVATIONS</i>	14	51-55	2010
C. K. Chandrashenkar, B. Basavalingu, K. M. Lokantha Rai, S. Ananda, T. Tonthai, <u>K. Soga</u> and K. Byrappa	Novel method of synthesis of R ³⁺ :YVO ₄ (where R=Nd, Er) crystals	<i>MATERIALS RESEARCH INNOVATIONS</i>	14	38-44	2010
S. Watanabe, H. Hyodo, H. Taguchi, <u>K. Soga</u> , Y. Takanashi, M. Matsumoto	Calcination- and Etching-Free Photolithography of Inorganic Phosphor Films Consisting of Rare Earth Ion Doped Nanoparticles on Plastic Sheets	<i>ADVANCED FUNCTIONAL MATERIALS</i>	21	4264-4269	2011
H. Yoshida, K. Morita, B.N. Kim, K. Hiraga, K. Yamanaka, <u>K. Soga</u> , T. Yamamoto	Low-Temperature Spark Plasma Sintering of Yttria Ceramics with Ultrafine Grain Size	<i>JOURNAL OF THE AMERICAN CERAMIC SOCIETY</i>	94	3301-3307	2011
M. Kamimura, N. Kanayama, K. Tokuzen, <u>K. Soga</u> , Y. Nagasaki	Near-infrared (1550 nm) in vivo bioimaging based on rare-earth doped ceramic nanophosphors modified with PEG-b-poly(4-vinyl benzylphosphonate)	<i>NANOSCALE</i>	3	3705-3713	2011

Eva Hemmer, Hiroyuki Takeshita, Tomoyoshi Yamano, Takanori Fujiki, Yvonne Kohl, Karin Low, Nallusamy Venkatachalam, Hiroshi Hyodo, Hidehiro Kishimoto and <u>Kohei Soga</u>	in vitro and in vivo investigations of upconversion and NIR emitting Gd ₂ O ₃ :Er ³⁺ , Yb ³⁺ nanostructures for biomedical applications	<i>Journal of Materials Science-Materials in Medicine</i>	23	2399-2412	2012
<u>Kohei Soga</u> , Kimikazu Tokuzen, Keisuke Fukuda, Hiroshi Hyodo, Eva Hemmer, Nallusamy Venkatachalam, Hidehiro Kishimoto	Application of Ceramic/Polymer Conjugate Materials for Near Infrared Biophotonics	<i>Journal of Photopolymer Science and Technology</i>	25	57-62	2012
Do-Myoung Kim, <u>Mitsuo Umetsu</u> , Kyo Takai, Takashi Matsuyama, Nobuhiro Ishida, Haruo Takahashi, Ryutaro Asano, and Izumi Kumagai	Enhancement of cellulolytic enzyme activity by clustering of cellulose binding domain on nanoscaffolds	<i>Small</i>	7	656-664	2011
Takanari Togashi, Nozomi Yokoo, <u>Mitsuo Umetsu</u> , Satoshi Ohara, Takashi Naka, Seiichi Takami, Hiroya Abe, Izumi Kumagai, and Tadafumi Adschiri	Material-binding peptide application -ZnO crystal structure control by means of a ZnO-binding peptide	<i>Journal of Bioscience and Bioengineering</i>	11	140-145	2011
<u>Mitsuo Umetsu</u> , Takeshi Nakanishi, Ryutaro Asano, Takamitsu Hattori, and Izumi Kumagai	Protein-protein interactions and selection: generation of molecule-binding proteins on the basis of tertiary structural information	<i>FEBS Journal</i>	277	2006-2014	2010
H. Watanabe, K. Kanazaki, T. Nakanishi, H. Shiotsuka, S. Hatakeyama, M. Kaieda, T. Imamura, <u>M. Umetsu</u> , I. Kumagai	Biomimetic engineering of modular bispecific antibodies for biomolecule immobilization	<i>Langmuir</i>	27	9656-9661	2011
R. Asano, K. Ikoma, I. Shimomura, S. Taki, T. Nakanishi, <u>M. Umetsu</u> , I. Kumagai	Cytotoxic enhancement of a bispecific diabody by format conversion to tandem single-chain variable fragment (taFv) THE CASE OF THE hEx3 DIABODY	<i>The Journal of Biological Chemistry</i>	286	1812-1818	2011

T. Togashi, N. Yokoo, <u>M. Umetsu</u> , <u>S. Ohara</u> , T. Naka, <u>S. Takami</u> , H. Abe, I. Kumagai, T. Adschiri,	Material-binding peptide application -ZnO crystal structure control by means of a ZnO-binding peptide-	<i>Journal of Bioscience and Bioengineering</i>	111	140-145	2011
Daniel Oliveira, Do-Myoung Kim, <u>Mitsuo Umetsu</u> , Izumi Kumagai, Tadafumi Adschiri, and Winfried Teizer	The assembly of kinesin-based nanotransport systems	<i>Journal of Applied Physics</i>	112	124703(1-8)	2012
Aurélien Sikora, Daniel Oliveira, Kyongwan Kim, Andrew L. Liao, <u>Mitsuo Umetsu</u> , Izumi Kumagai, Tadafumi Adschiri, Wonmuk Hwang, and Winfried Teizer	Quantum Dot Motion on Microtubules	<i>Chemistry Letters</i>	41	1215-1217	2012
Takamitsu Hattori, <u>Mitsuo Umetsu</u> , Takeshi Nakanishi, Satoko Sawai, Shinsuke Kikuchi, Ryutaro Asano, and Izumi Kumagai	A high-affinity gold-binding camel antibody: Antibody engineering for one-pot functionalization of gold nanoparticles as biointerface molecules	<i>Bioconjugate Chemistry</i>	23	1934-1944	2012
Jinghua Han, Satoshi Ohara, Kaduyoshi Sato, Hui Xu, Zhenquan Tan, Yoshiaki Morisada, Kazuo Kuruma, Makio Naito, Ping Shan, <u>Mitsuo Umetsu</u>	Directed assembly of metal oxide nanoparticles by DNA	<i>Materials Letters</i>	79	78-80	2012
Ryutaro Asano, Makoto Nakayama, Hiroko Kawaguchi, Tsuguo Kubota, Takeshi Nakanishi, <u>Mitsuo Umetsu</u> , Hiroki Hayashi, Yu Katayose, Michiaki Unno, Toshio Kudo, and Izumi Kumagai	Construction and humanization of a functional bispecific EGFR CD16 diabody using a refolding system	<i>FEBS Journal</i>	279 (2)	223-233	2012

