

Returnee's Report

Name :	Akiko Obata
Status :	Assistant Professor, Graduate School of Engineering, Nagoya Institute of Technology
Name of the University where I attend / Country :	Imperial College London (UK)
Research Theme :	Development of novel polymer and ceramics hybrid biomaterials
Duration :	Oct. 2009 ~ Sep. 2010
Advisor's name at the University :	Dr. Julian R Jones
Research Theme in detail :	
<p><Goals></p> <p>Aim of this work is to develop biomaterials enhancing bone formation using poly(glutamic acid) (PGA) and siloxane-doped vaterite (CaCO_3). PGA is one of the biodegradable polymers. The siloxane-doped vaterite, which has been developed by our research group, releases soluble silica and calcium ions. These ions have been reported to enhance bone formation. I tried to prepare the hybrid materials without organic solvent, control the degradation speed of PGA in the materials, and characterize their structures.</p>	
<p><Results></p> <p>A simple method using distilled water was established. XRD analysis showed that vaterite powders in the composites did not change their crystal phase from vaterite to calcite, which is the most stable in the three polymorphs of calcium carbonate, even they were mixed with PGA using water as a solvent. FT-IR analysis suggested carbonyl groups in PGA chemically reacted with epoxy groups in GPTMS and calcium ions on vaterite particle surfaces.</p>	
<p><Achievements></p> <p>PGA is a polyanionic biopolymer with glutamic acid and has nontoxicity to human and environmental benignity. This polymer, however, has been hardly researched for the application to scaffold materials for bone reconstruction.</p> <p>The present work suggested the degradation speed of PGA is able to be controlled, making hybrids with silane coupling agents. The hybrids were expected to be useful</p>	

as scaffold materials having flexibility, elasticity, and biodegradability. In addition, the hybrids containing siloxane-doped vaterite were successfully prepared as well. The materials were expected to be a good candidate for biomaterials releasing silicon and calcium that enhance the bone formation in body.

About the laboratory I belong to (Number of faculty members and students, Methods used in research activity:

Dr. Jones, 1 PhD researcher, and 10 PhD course students.

Doing their work in collaboration with other research groups of ICL, other Universities, and some companies. It's pretty aggressive.

Comments about the workshops and seminars I attended :

1. Electrospun Fibrous Membranes Based on Poly(lactic acid) for Guided Bone Regeneration. Akiko Obata, Takashi Wakita, Yoshio Ota and Toshihiro Kasuga. 22th Inter. Symp. Ceramics in Medicine, Daegu, Korea, 2009.10.26-29
2. Ion Releasing Abilities of Phosphate Invert Glasses Containing MgO, CaO or SrO in Tris Buffer Solution. Sungho Lee, Akiko Obata and Toshihiro Kasuga. 22th Inter. Symp. Ceramics in Medicine, Daegu, Korea, 2009.10.26-29
3. Cell-Intercepting Ability of Electrospun Poly(lactic-acid)-based Fibermats. Kie Fujikura, Akiko Obata and Toshihiro Kasuga. 22th Inter. Symp. Ceramics in Medicine, Daegu, Korea, 2009.10.26-29
4. Preparation of Poly(lactic acid)/Si-doped Vaterite Hybrid Microbeads. Jin Nakamura, Akiko Obata and Toshihiro Kasuga. 22th Inter. Symp. Ceramics in Medicine, Daegu, Korea, 2009.10.26-29
5. Polymer-based Composite Coating on Zirconia Ceramics. Yuta Kogo, Akiko Obata and Toshihiro Kasuga. 22th Inter. Symp. Ceramics in Medicine, Daegu, Korea, 2009.10.26-29
6. Poly(lactic acid)-based Fibrous Membranes Releasing Silicon Species. Akiko Obata, Toshihiro Kasuga, Julian R Jones. TERMIS-EU 2010, Galway, Ireland, 2010.06.13-17.
7. Preparation of Poly(lactic acid)-based Fibrous Membranes Releasing Silicon Species by Electrospinning. . Akiko Obata, Toshihiro Kasuga, Julian R Jones. 23rd European Conference on Biomaterials, Tampere, Finland, 2010.09.11-15.

8. Optimization of Fiber Diameter in Electrospun Fiber for Three Dimensional Tissue Engineering Scaffold, Kie Fujikura, Akiko Obata, Toshihiro Kasuga, The 23rd European Conference on Biomaterials, Tampere, Finland, 2010.09.11-15.
9. Biodegradable Materials Releasing Silicon and Calcium Species for Bone Reconstruction, Akiko Obata. Symposium on Life Science (accepted)
10. Preparation of Scaffold Materials Releasing Silicon and Calcium Ions for Bone Reconstruction. Akiko Obata, Shinya Yamada, Toshihiro Kasuga, Julian R Jones. The 3rd International Congress on Ceramics (ICC3) (accepted).
11. Calcium Carbonate / Polymer Composites Releasing Silicon and Calcium Species for Biomaterials. Akiko Obata, Shinya Yamada, Julian R Jones, Toshihiro Kasuga. 27th Korea-Japan International Seminar on Ceramics (submitted).

My Ambitions :

I would like to take full advantage of my experience at Imperial College London to improve my research here and also keep a human network, which I built up at the college, to work internationally.

Advice and suggestions for young researchers who will visit **partner schools and other institutions** :

I'm sure you will be able to be stimulated and have a lot of special experience as a researcher during your visit in the partner schools. There are a lot of researchers and students having different nationalities and various backgrounds, particularly in Imperial College London. I hope you could have fantastic meeting and experience through your research life.

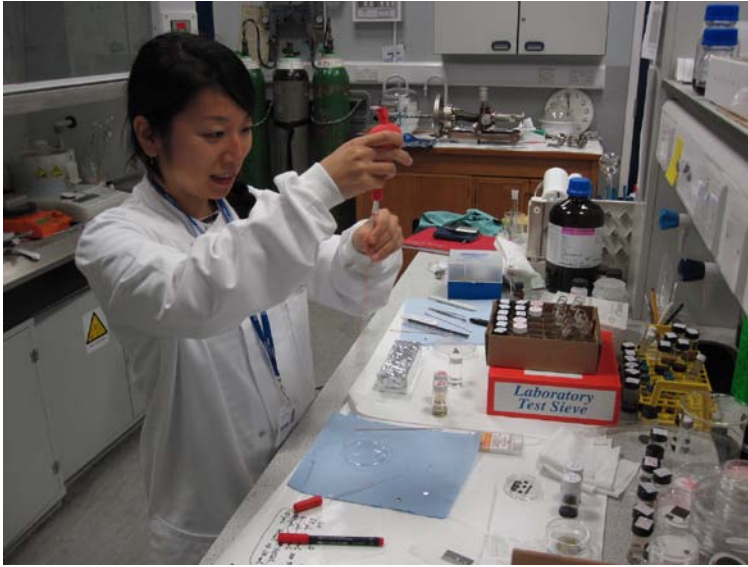


Photo 1. In the laboratory of ICL.



Photo 2. Joined an international institute meeting with laboratory members of Dr. Jones.



Photo 3. With my co-worker of the laboratory.