Returnee's Report

Name：	Masato Shimoda
Status：	Masters year 1 Nagoya Institute of Technology
Name of Exchange University：	ENSCI/ Limoges University (SPCTS)
Research Theme：	Glass-ceramics based on the composition $Bi_{0.5}Nb_{0.5}Te_3O_8$: synthesis and characterizations
Duration：	2013/ 09/1~2013/02/25 (180days)
NITECH Faculty Advisor：	Associate Prof. T. Hayakawa
Exchange University Faculty Advisor：	Prof. G. Delaizir, J.-R. Duclère, J. Carreaud, M. Colas, P. Thomas

Research Theme in detail：

<Goal>

Our first objective was to get fully transparent tellurite glass-ceramic which was composed of cubic phase of $Nb_{0.5}Bi_{0.5}Te_3O_8$ and also to investigate photoluminescene properties of the samples when rare earth was doped and struck in cubic phase of $Nb_{0.5}Bi_{0.5}Te_3O_8$. However, so far we did not succeed to make such a crystallized phase. What we practically obtained was $Bi_2Te_4O_{11}$ which is so called "*anti-glass*". That's why we investigated the properties of glass-ceramic composed of *anti-glass* in terms of structural analysis.

<Result>

We confirmed sphere-shape like crystallization phase in the samples. As developing time for crystal growth increase, the number of sphere-shape like phases increased but its transmittance of samples decreased. It was due to the difference of refractive index between the glass and the crystalized phase and to cracks which we confirmed after 11 hours of the developing time. We also determined the parameter for nucleation growth to further investigate the crystallization properties.

<Achievement>

We succeeded to make bulk crystallization in the system TeO_2-Nb_2O_5-Bi_2O_3 and sphere-like shapes appeared in the glass matrix through crystal growth process.

More tiny sphere-like shapes were formed inside the glass matrix through nucleation process and crystal growth process compared to the sample through only crystal growth

process. After 11h of developing time for crystal growth, the sample became opaque.
The mechanism for the crystalized phases with “sphere-like shapes” could be explained by phase separation in the based glass before it became glass-ceramic.

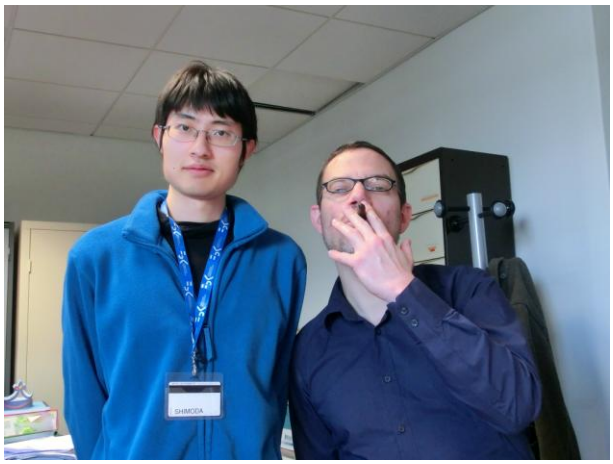
About the laboratory I was sent to（number of faculty and students, methods used in research activity: I was welcomed by the members of SPCTS (research center). There were many researchers around the world there and it was a nice experience to do experiment with people of different fields I haven’t known before. Meetings with teachers were held whenever I wanted to discuss with them. That meant that as soon as I got some results and reported it to my teachers immediately, a next experiment plan was given to me quickly. I could do my experiments so smoothly and found such a research activity so exciting and meaningful.

Comments about the workshops and seminars I attended : I attended an international conference (ISIEM 2013) in Rennes and presented my poster there for what I did research in japan by the favor of director of SPCTS.
Also I attended a domestic conference in Limoges (Journées plénières USTV - GDR VERRES) and also presented the poster as same as ISIEM 2013.

My Ambitions：
I learned the importance of being active to not only research but also lesson I took in the school and my French life in Limoges. As being so active, I could get not only knowledge about the crystalized glass in ENSCI/Limoges University but also lots of things from many foreign friends. So I would like to continue to be active in the future and make my future also fruitful.

Advice and suggestions for young researchers who will go to exchange universities ：
Studying abroad is so precious chance especialy in commicating with foreign people. I suggest that you should be active to comminucate with foreign people and exchange your idea with them and not bring together only with Japanese people because it means just waste of time and prevent you from growing through studying abroad.

The meeting we had when Prof. Hayakawa came to France.



Picture with Prof. Jean Rene

With my friends