

Returnee's Report

Name :	Minato KATO
Status :	Masters year 1 Nagoya Institute of Technology
Name of Exchange University :	Friedrich-Alexander-Universität Erlangen-Nürnberg
Research Theme :	Influence of the binder and solvent type of ITO green tapes
Duration :	2013/ 9/2~2013/11/30 (90days)
NITECH Faculty Advisor :	Prof. Ken-ichi Kakimoto
Exchange University Faculty Advisor :	Prof. Andreas Roosen
<p>Research Theme in detail :</p> <p><Goal></p> <p>Transparent, conductive oxides (TCOs) as indium tin oxide (ITO) are important materials for a lot of electronic applications such as touch screens, solar cells and displays because ITO has high electrical conductivity and transparency. Conventionally expensive, vacuum-based sputtering techniques are used for manufacturing of thin TCO layers. However, sputtered layers are brittle and they are unsuitable for the use on flexible substrate. In the past, tape casting of ITO green tapes was successfully performed using PVB and ethanol. Therefore this research has focused on manufacturing ITO green tapes using PVP and water by tape casting at room atmosphere and temperature to research influence of the binder and solvent type.</p> <p><Result></p> <p>Most of ethanol-based slurries had good wettability on both sides of carrier tape (PET and Si-coat). As for water-based slurries, there were wettability problems, for example, heterogeneous surface and some holes of green tapes due to high surface tension. However, the slurries using PVP K90 as binder had high viscosity and their green tapes had homogeneous surface. In both of solvents cases, transparency and specific resistance of green tapes decreased with increasing ITO content. However, regarding green tapes of ITO 1.00 (8.8 vol%), these specific resistance results were larger than ITO 1.29 (7.7 vol%) because it seems that ITO powder content was not compatible with the amount of binder in ITO 1.00. Thus PVP didn't work actively in ITO 1.00.</p> <p><Achievement></p> <p>Water-based green tapes had thinner thickness, lower specific resistance ($8 \Omega \cdot \text{cm}$), and higher transparency (80 %) than ethanol-based green tapes. Therefore, water-based green tapes using PVP K90 were thin and high quality ITO green tapes.</p>	

About the laboratory I was sent to (number of faculty and students, methods used in research activity):

Professor : Prof. Andreas Roosen

Number : 10~12

Theme : Synthesis of functional ceramics by using tape casting and lamination technique

Core time : 8:30~17:00

Meeting : 6 times

Comments about the workshops and seminars I attended:

Glasswork

My Ambitions :

- Making out schedules systematically (short-, middle-, long-period)
- Taking some experiments intensively for a short time
- Understanding different and our culture
- Trying to make good use of my spare time

Advice and suggestions for young researchers who will go to exchange universities :

- Making out schedules of research and free time will lead to a very fulfilling life
- It will be possible to understand our culture by understanding different culture
- It is important not to worry too much



Fig. 1 Research facility



Fig. 2 Dinner (Schnitzel)



Fig. 3 BBQ party