

Technical Digest

The 18th International Conference
on Crystal Growth and Epitaxy

ICCGE-18

Nagoya, Japan

August 7th - 12th, 2016

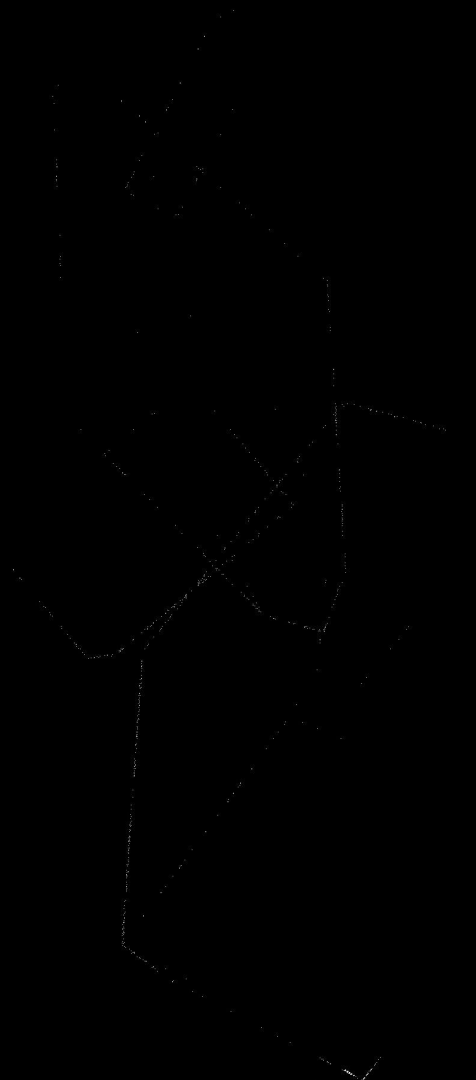
in conjunction with

The 16th International Summer School
on Crystal Growth

ISSCG-16

Lake Biwa, Shiga, Japan

August 1st - 7th, 2016



Program at a Glance

	Aug. 7 (Sun)	Aug. 8 (Mon)	Aug. 9 (Tue)	Aug. 10 (Wed)	Aug. 11 (Thu)	Aug. 12 (Fri)
8:00			Registration	Registration	Registration	Registration
9:00		Ceremony Plenary 1 <i>Akasaki</i>	Award 3	Plenary 5 <i>Amano</i>	Plenary 6 <i>Ross</i>	Plenary 7 <i>Kuech</i>
10:00			Plenary 4 <i>Hu and Chen</i>	Coffee Break	Coffee Break	Coffee Break
11:00			Coffee Break	We1 G01, G03, G05, G06, J01, T01, T04, T06, T09	Th1 G01, G03, G05, G06, G09, T01, T02, T03, T04, T06	Fr1 G06, G09, G11, T02, T03, T04, T05, T06, T08, T10
12:00		Tu1 G01, G02, G03, G04, G06, G07, G08, G10, T07, T09	Excursion			
13:00		Lunch		Lunch	IOCG Executive Committee Meeting	IOCG Assembly
14:00	JACG Meeting	Plenary 2 <i>Galazka</i> Plenary 3 <i>Frenkel</i>	Tu2 G01, G02, G03, G04, G06, G07, G08, J01, T07, T09	Excursion	Th2 G06, G09, G11, T02, T03, T04, T05, T06, T08, T10	
15:00		Award 1 Award 2	Coffee Break		Poster 3 G06, G09, G11, T02, T03, T04, T05, T08, T10	
16:00	Registration	Coffee Break	Tu3 G01, G03, G04, G05, G06, G07, J01, T01, T06, T09			
17:00		Mo1 G01, G02, G03, G04, G07, G08, G10, T07, T09	Poster 2 G05, G06, G10, J01, T01, T06, T09			
18:00	Welcome Reception	Poster 1 G01, G02, G03, G04, G07, G08, T07				
19:00						
20:00					Banquet	

performance of grown crystals, the Ga and Ge contents of the crystal were tuned in this study by changing the composition of raw materials. It was found that the Ga content of the crystal linearly increases with that of the raw material. The clathrate with Ga content of 16.7 possesses the highest power factor of $2 \times 10^{-3} \text{ Wm}^{-1} \text{ K}^{-2}$ at 500 degree C, as this sample also possesses the highest electrical conductivity among all samples.

18:40 MoP-T07-6 Poster (120 min)

Investigation of relaxor-PT single crystals for practical applications

H. Luo*, X. Zhao, W. Di, H. Deng, X. Li

Shanghai Institute of Ceramics, Chinese Academy of Sciences, China

More than 3 inches in diameter PMN-PT and PIN-PMN-PT single crystals are grown along (001) by the modified Bridgman technique for mass production in SICCAS. These relaxor-PT crystals exhibit not only extrahigh piezoelectric performances, but also excellent optoelectric and pyroelectric performances. They are good candidates for the next generation of ultrasonic transducers, actuators, transformers and infrared detectors etc.

18:40 MoP-T07-7 Poster (120 min)

The effect of complex electrodeposition by the addition of Multi-layered graphene on copper nanoparticles

Y.-L. Cho¹*, J.-W. Lee¹, Y.-I. Song², C. Park³, S.-J. Suh²

¹School of Advanced Materials Science & Engineering,

²Advanced Materials and Process Research for IT,

Sungkyunkwan University, Korea, ³Pukyong National University, Korea

We demonstrated complex electroplating of metal nanoparticles with multi-layered graphene films. Complex electroplating was carried out in an electrolyte, and multi-layered graphene coated copper nanoparticles (MGCNs) were created using an electrical explosion method, which is an easy technique of creating nanoparticles. The MGCNs had a diameter smaller than 100 nm and a copper core-shell structure with multiple layers of graphene. Cyclic voltammetry was performed to analyze the electrochemical behavior of the MGCNs. The microstructure and particle size of the MGCNs was also observed using TEM and Raman spectroscopy. The resistivity of the copper electroplating was $2.28 \times 10^{-6} \text{ ohm cm}$, and the resistivity of the complex electroplated MGCNs was decreased by 12.7% to $1.99 \times 10^{-6} \text{ ohm cm}$. Owing to their lower resistivity, MGCNs can be used in copper interconnections for PCB or semiconductor processes.

18:40 MoP-T07-8 Poster (120 min)

Single crystal growth and exploration of new iron-based superconductors in Ca-RE-Fe-As system

H. Ogino^{1,2}*, H. Yakita¹, A. Sala², A. Iyo², H. Eisaki², J. Shimoyama³, K. Kishio¹

¹The University of Tokyo, Japan, ²National Institute of Advanced Industrial Science and Technology, Japan,

³Aoyama Gakuin University, Japan

After the discovery of high- T_c superconductivity in LaFeAs(O,F) , many Fe-based superconductors were discovered. In order to clarify the origin of

superconductivity in Ca-RE-Fe-As system, we have grown Pr doped CaFe_2As_2 single crystals. These samples showed two-step transitions at $T_{c1} \sim 40 \text{ K}$, and $T_{c2} \sim 20 \text{ K}$. However, the superconducting volume fraction above T_{c2} was always very low, indicating that 40 K-class superconductivity is not originated from the bulk superconductivity. On the other hand, we have discovered another compound $(\text{Ca,RE})\text{FeAs}_2$. Crystal structure of the $(\text{Ca,Pr})\text{FeAs}_2$ is composed of Ca(Pr) planes, Fe_2As_2 layer and As_2 chain layer. $(\text{Ca,Pr})\text{FeAs}_2$ showed superconductivity with up to $T_c \sim 30 \text{ K}$. From the measurement of anisotropy, the compound show exceptionally low anisotropy considering its relatively large c-axis length. Such feature is attributed to the structure of the blocking layer, and this may lead to new class of iron-based superconductor with high T_c and low anisotropy.

18:40 MoP-T07-9 Poster (120 min)

Crystal Structure and Luminescence properties of the Novel $\text{KSrR(BO}_3)_2$ with $R = \text{Y, Tb, Yb}$

A. K. Bolatov¹*, A. E. Kokh², N. G. Kononova², V. S. Shevchenko², Yu. V. Seryotkin^{2,3}, Kh. A. Abdullin¹, B. M. Uralbekov¹, M. Burkitbayev¹

¹Al-Farabi Kazakh National University, Kazakhstan,

²V.S. Sobolev Institute of Geology and Mineralogy SB RAS, Russia, ³Novosibirsk state university, Russia

A new borate $\text{KSrY(BO}_3)_2$ was obtained by solid state synthesis and spontaneous crystallization using selected flux. In addition, two isostructural compounds $\text{KSrTb(BO}_3)_2$ and $\text{KSrYb(BO}_3)_2$ were also prepared using solid state techniques. $\text{KSrY(BO}_3)_2$ crystallizes in monoclinic space group P21/m. The base building block for this structure is the two-layer $\{\text{Y}[\text{KSr(BO}_3)_2]\}$ package with one package on c-period. The infrared spectrum indicates that the $\text{KSrR(BO}_3)_2$ compounds contain characteristic $(\text{BO}_3)^{3-}$ groups as its basic structural units, which is in agreement with the single crystal X-ray diffraction studies.

18:40 MoP-T07-10 Poster (120 min)

Field-induced phase transition and electromechanical properties of PLZST antiferroelectric single crystal

Q. Li¹*, J. H. Gao¹, F. P. Zhuo¹, Q. F. Yan¹, Y. L. Zhang²

¹Department of Chemistry, ²State Key Laboratory of New Ceramics and Fine Processing, Tsinghua University, China

PLZST single crystal near MPB was proved to possess an antiferroelectric and ferroelectric phase coexistence structure, with the AFE phase dominated, at room temperature. Temperature dependent polarization measurement indicated that AFE phase could be induced into a metastable field induced FE phase. A temperature induced phase transition from induced FE to AFE state had been proved by its electric measurement. And a remarkable strain of 0.75% was obtained.

18:40 MoP-T07-11 Poster (120 min)

Multiscale investigation of electronic structures and optical properties induced by mc-Si defects on solar cell performance

O. A. Al-Ani*, J. P. Goss, A. M.A. Sabaawi, P. R. Briddon, M. J. Rayson, N. E. B. Cowern

Newcastle University, UK

The optical and electronic properties of silicon due point