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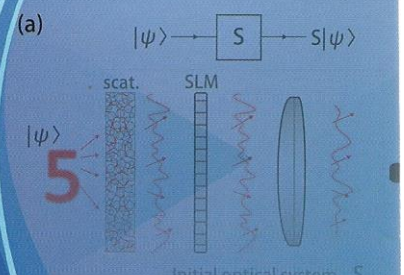


# 한국 물리학회 회보

## 2016 봄학술논문발표회 및 제92회 정기총회

2016.4.20(수)~22(금)
대전컨벤션센터


KPS 한국물리학회
The Korean Physical Society

of Materials Science and Engineering, UNIST, [2]IBS Center for Integrated Nanostructure Physics, Sungkyunkwan University, [3]Department of Energy Science, Sungkyunkwan University)

C3.02* [09:12-09:24]

**Influence of dislocations on local metal-insulator transition behaviors of $VO_2/TiO_2$ thin films** / SOHN Ahrum[1], KIM Dong-Wook*[1], KANKI Teruo[2], TANAKA Hidekazu[2]([1]Department of Physics, Ewha Womans University, Seoul 120-750, Korea, [2]The Institute of Scientific and Industrial Research, Osaka University, 565-0871, Japan)

C3.03* [09:24-09:36]

**Synthesis and luminescent properties of Tb3+ or Sm3+ ions activated Sr2Gd8Si6O26 oxyapatite materials** / KHAJA HUSSAIN SK., YU Jae Su*(Department of Electronics and Radio Engineering Kyung Hee University)

C3.04* [09:36-09:48]

**Mie-resonance-mediated light trapping and spatial modulation of photo-generated carriers in P3HT/Si nanopillars** / **KIM Eunah, CHO Yunae, LEE Y.U., WU J.W., KIM Dong-Wook***(Department of Physics, Ewha Womans University, Seoul 120-750, Korea)

C3.05* [09:48-10:00]

**High Brightness Quantum Dots Light-Emitting Devices using Polyvinyl pyrrolidone-capped ZnO Nanoparticles** / LEE Jun-Woo[1], LEE Jae-Sung[1], KIM Ok-Sik[2], KIM Sang-Hyup[1], LEE Sang-Won[1], KIM Sae-Wan[1], KIM Ju-Seong[1], KWON Jin-Beom[1], CHOI Kyung-Jae[2], KANG Shin-Won*[1] ([1]School of Electronics Engineering, College of IT Engineering, Kyungpook National University, [2]Department of Sensor and Display Enginnering, Kyungpook National University)

C3.06* [10:00-10:12]

**Thermodynamic and Memory Characteristic Aspects of Fixed Oxide Charge and Cobalt Quantum Dot in Metal-Semiconductor Hybrid Nanostructures** / AHN Hanyeol, GU Minseon, JOO Beom Soo, HAN Monnsup*(Department of Physics University of Seoul)

C3.07* [10:12-10:24]

**Effect of Auger Recombination on Luminescence Properties of Si-NC/$SiO_2$ Multi-layers Induced by Donor and Acceptor State** / JOO Beom Soo[1], JANG Seunghun[2], GU Minseon[1], PARK Youngju[1], HAN Moonsup*[1]([1]Department of Physics University of Seoul, [2]Advanced Materials Division Korea Research Institute of Chemical Technology)



C3.08* [10:24-10:36]

**Consistent Bipolar Resistive Switching Behavior of Epitaxial Brownmillerite $SrFeO_{2.5}$ Thin Film for Nonvolatile Memory Application** / RAVEENDRA Nallagatla Venkata, ACHARYA Susant Kumar, JUNG Chang Uk*(Department of Physics and Oxide Research Centre, Hankuk University of Foreign Studies)



**[C4-st] Complex Systems**

2016년 4월 21일 목요일 09:00 – 10:24 장소: 104호

좌장: **김 범 준** 성균관대

C4.01 [09:00-09:12]

**Effect of Network Architecture on Population Synchronization in A Scale-Free Network of Bursting Neurons** / 김상윤, 임우창*(대구교육대학교 과학교육과, 계산신경과학연구소)

C4.02 [09:12-09:24]

**Burstiness parameter for finite event sequences** / KIM Eun-Kyeong[1], JO Hang-Hyun*[2, 3]([1]GeoVISTA Center, Department of Geography, Pennsylvania State University, PA, USA, [2]Department of Physics, POSTECH, Korea, [3]Department of Computer Science, Aalto University, Finland)

C4.03 [09:24-09:36]

**Inverse transitions in a spin-glass model on a scale-free network** / 김도현 *(서강대학교 물리학과)

C4.04 [09:36-09:48]

**Mapping Out Narrative Structures and Dynamics Through Network Modeling and Computational Linguistics** / MIN Semi, PARK Juyong*(Graduate School of Culture Technology, KAIST)

C4.05 [09:48-10:00]

**Generating synthetic populations** / 손우식*(국가수리과학연구소)

C4.06 [10:00-10:12]

**Complexity in financial analysts: Role of information disparity in analyst forecasts** / KIM Chansoo[1], KIM Daniel S.[2], LIN Yingdong[1, 2], AHN Kwangwon*[2], CHOI MooYoung*[3]([1]Computational Economics Lab., Center for Computational Science, Korea Insti. of Science and Tech., [2]HSBC Business School, Peking University, [3]Department of Physics and Astronomy and Center for Theoretical Physics, Seoul National University)

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# Effect of Network Architecture on Population Synchronization in A Scale-Free Network of Bursting Neurons

김상윤[1], 임우창*[1]
[1]대구교육대학교 과학교육과 , 계산신경과학연구소
*wclim@icn.re.kr

**Abstract:**

We investigate the effect of network architecture on burst and spike synchronization in a directed scale-free network (SFN) of bursting neurons, evolved via two independent $\alpha$- and $\beta$-processes. The $\alpha$-process corresponds to a directed version of the Barabási-Albert SFN model with growth and preferential attachment, while for the $\beta$-process only preferential attachments between pre-existing nodes are made without addition of new nodes. We first consider the "pure" $\beta$-process of symmetric preferential attachment (with the same in- and out-degrees), and study emergence of burst and spike synchronization by varying the coupling strength J and the noise intensity D for a fixed attachment degree. Characterizations of burst and spike synchronization are also made by employing realistic order parameters and statistical-mechanical measures. Next, we choose appropriate values of J and D where only burst synchronization occurs, and investigate the effect of the scale-free connectivity on the burst synchronization by varying (1) the symmetric attachment degree and (2) the asymmetry parameter (representing deviation from the symmetric case) in the $\alpha$-process, and (3) the occurrence probability of the $\beta$-process. In all these three cases, changes in the type and the degree of population synchronization are studied in connection with the network topology such as the degree distribution, the average path length $L_p$, and the betweenness centralization $B_c$. It is thus found that just taking into consideration $L_p$ and $B_c$ (affecting global communication between nodes) is not sufficient to understand emergence of population synchronization in SFNs, and in addition to them, the in-degree distribution (affecting individual dynamics) must also be considered to fully understand for the effective population synchronization.

**Keywords:**

Bursting neurons, Burst synchronization, Intraburst spike synchronization, Directed scale-free networks, Network topology