

Abstracts

The 13th International Conference of
Women Engineers and Scientists

August 26~29, 2005 Seoul, Korea

ICWES¹³
KOREA 2005

Organized by



The Association of
Korean Woman Scientists and Engineers

Supported by



과학기술부
Ministry of Science & Technology




Ewha Womans Univ.



International Network of
Women Engineers and Scientists

Acknowledgement

The Organizing Committee gratefully acknowledges the generous support of the following sponsors.

 **과학기술부** MINISTRY OF SCIENCE AND TECHNOLOGY

 **Ewha Womans Univ.** EWHA WOMANS UNIVERSITY


 **International Network of Women Engineers and Scientists** INTERNATIONAL NETWORK OF WOMEN ENGINEERS AND SCIENTISTS

SILVER

 **SEOUL METROPOLITAN GOVERNMENT** SEOUL METROPOLITAN GOVERNMENT


L'ORÉAL LOREAL

 **산업자원부** MINISTRY OF COMMERCE, INDUSTRY AND ENERGY

 **SAMSUNG ELECTRONICS** SAMSUNG ELECTRONICS

posco POSCO


SK Telecom SK TELECOM

 **KHNP** KHNP, DOOSAN HEAVY INDUSTRIES & CONSTRUCTION AND OTHER 24 NUCLEAR POWER COMPANIES


BRONZE


 **KOSF** KOREA SCIENCE AND ENGINEERING FOUNDATION

 **한국산업기술재단** KOREA INDUSTRIAL TECHNOLOGY FOUNDATION

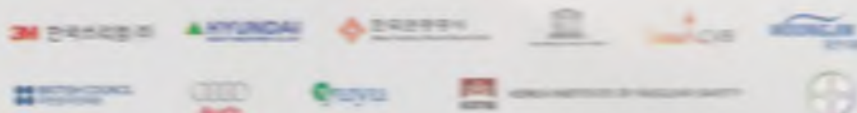
 **한국과학문화재단** KOREA SCIENCE FOUNDATION

 **NIS WIST** NATIONAL INSTITUTE FOR SUPPORTING WOMEN IN SCIENCE AND TECHNOLOGY

 **KOWACO** KOREA WATER RESOURCES CORPORATION

 **동원F&B** DONGWON F&B CO., LTD.

OTHERS



NT_O2_03

SINGLE EXCITON PICTURE OF SELF-ASSEMBLED
InAs/GaAs QUANTUM DOTS

Sunida Awirothananon¹, Simon Fafard^{1,2}

¹Department of Physics, University of Ottawa, Ottawa, Ontario,
Canada

²Cyrium Technologies, Ottawa, Ontario, Canada

Photoluminescence (PL) measured as a function of magnetic field in faraday configuration has been used as a practical tool to probe the confined states of self-assembled quantum dot (QDs), which has characteristics as atoms like density of state. A degeneracy of the excited states is lifted up with introduction of magnetic field. In other words, two-fold splitting for both the first (p-shell) and second excited state (d-shell) emission peaks are revealed. This result is analogous to a Fock-Darwin like shell structures of the confined electron-hole droplets. However, analysis of such experiments can be cumbersome due to many body interactions. In contrast, the photoluminescence excitation (PLE) spectrum, where only a single exciton is created at a time, allows us to interpret our absorption result in term of a single-exciton shell structure. Two strong resonances are blue shifted by ~14 meV and ~21 meV with respect to the p- and d-shell emission peaks, respectively. Clear evidence of splitting for both PL and PLE resonances, which corresponds to QD excited state transitions, suggests one can obtain information about carrier interaction in the QDs.

Keywords: single exciton picture, InAs/GaAs, Quantum dots, Fock-Darwin spectrum, photoluminescence excitation.

NT_O3_01

SILICA-ZIRCONIA HIGHDISPERSED MIXED OXIDE WITH
SURFACE BONDED ANTIMONY OXIDE

Galina Zaitseva, Valentina Kalibabchuk, Tatiana Reva

National Medical University, Kyiv, Ukraine

Silica-zirconia highdispersed mixed oxide, SiO₂/ZrO₂ was prepared by the sol-gel processing method and furthermore antimony (V) was bonded to the matrix surface, from an aqueous solution, resulting the material SiO₂/ZrO₂/Sb₂O₅. Samples with different zirconium and antimony contents were obtained. The specific surface areas, between 649 and 276 m².g⁻¹, and average pores diameter, between 0.64 and 0.78 nm, were obtained. The internal surface areas of SiO₂/ZrO₂/Sb₂O₅ mixed oxides are increased compared to initial SiO₂/ZrO₂ oxides and come to 460-300 m².g⁻¹. The pore size distribution indicated that the contribution of ultramicropores to the micropore volume of the material obtained is significant. The scanning electron microscopy images and the elements mapping showed that in every case, within the magnification used, zirconium and antimony were homogeneously dispersed in the matrices. Using pyridine as probe molecule, for both samples, SiO₂/ZrO₂ and SiO₂/ZrO₂/Sb₂O₅, presented thermally very stable Brønsted acid sites. The ion exchange capacities were determined for Li⁺, Na⁺ and K⁺ ions. For SiO₂/ZrO₂ samples the adsorption capacities were dependent on the nature of the cations, being higher in the order K⁺ > Na⁺ > Li⁺, while for SiO₂/ZrO₂/Sb₂O₅ in comparison with SiO₂/ZrO₂, the adsorption capacities were smaller and were independent of the cations nature. SiO₂/ZrO₂(1)/Sb₂O₅ with bonded Methylene Blue can be effective in order to developed new sensors for analytical application.

Keywords: mixed oxides, silica, zirconia, antimony, sensors.

NT_O3_02

CONTROL OF NI PARTICLE SIZE IN SALT-ASSISTED SPRAY
PYROLYSIS

Kee Young Koo, Seung Bin Park

Department of Chemical and Biomolecular Engineering, KAIST, 373-1,
Guseong-dong, Yuseong-gu, Daejeon, 305-701, Republic of Korea

Nickel particles are used for various areas such as a catalyst for SOFC (solid oxide fuel cell) electrode, MLCC (multilayer ceramic capacitor), nanomagnet and alkaline storage battery. To improve the performance of electronic materials, nickel particles are required to be controlled in size and shape.

In our research, nano-sized nickel particles were prepared by salt-assisted spray pyrolysis. Conventional spray pyrolysis is a process that one droplet changes to one particle, while many nanocrystallites are formed by salt-assisted spray pyrolysis. Salts play a role as a segregation reagent. Types of salts and molar ratio of [salt]/[Ni] are key control variables.

Nickel particles were prepared at 600 °C under a mixture of N₂/H₂ gas by salt-assisted spray pyrolysis. And then, the prepared particles were washed to remove the salts. The compositional homogeneity of particles and the amount of oxygen in powders were examined by XRD (x-ray diffraction) and EDS (energy dispersive spectrometer), respectively. XPS (x-ray photoelectron spectrometer) was performed to identify the remains of salt. The morphology and size of particles were characterized by SEM and TEM. The specific surface area of particles was measured by BET, and the particle size was calculated from surface area. As increasing the molar ratio of [salt]/[Ni], the particle size decreases. It was also found that the types of salt change the shape of particles.

Keywords: nickel, nano-sized particles, salt, spray pyrolysis

NT_O3_03

Cu(I)-H CATALYZED 1,2- AND 1,4-REDUCTIONS; Cu(OAc)₂
AS AN ALTERNATIVE TO CONVENTIONAL UNSTABLE
PRECURSORS

Jaesook Yun

Department of Molecular Science and Technology, Ajou University,
Suwon 443-749, Korea

An efficient, convenient in-situ generation protocol of Cu-H for the copper-catalyzed hydrosilylations is developed. Air and moisture stable copper(II) salts such as copper(II) acetate, copper(II) acetate monohydrate can be activated by organosilanes to generate Cu-H. This protocol is advantageous over the existing methods that employs copper(I) chloride and sodium *t*-butoxide; it obviates the need to use alkoxide bases for catalyst activation and avoids handling air sensitive materials. The thermally stable copper(I) hydride cluster [(PPh₃)₃CuH]₂, known as Stryker's reagent can be prepared by mixing copper(II) acetate and triphenylphosphine, in the presence of an organosilane. Diphenylsilane was the most efficient among the silanes screened to afford the product in 82% yield. This synthetic method constitutes a convenient and simple procedure for the preparation of widely-used Stryker's reagent directly from a Cu(II) precursor. The in-situ generation of Cu-H ligated by chiral BINAP (= 2,2'-bis(diphenylphosphino)-1,1'-binaphthyl) in the presence of an organosilane leads to an active reducing system efficient for the asymmetric hydrosilylation of aromatic ketones. Various aromatic ketones were reduced to the corresponding alcohols efficiently with a good level of enantioselectivity. α,β -Unsaturated nitriles were chemoselectively reduced to the corresponding saturated nitriles in high yields using a copper-DPEphos (= bis(2-diphenylphosphino)ether) or Xantphos (= 9,9-dimethyl-4,6-bis(diphenylphosphino)-xanthene) complex as catalyst. The bisphosphine-Cu complexes with Xantphos or DPEphos are thermally more stable and efficient than the Cu-BINAP complex for the hydrosilylation of nitriles.

Keywords: Stryker's reagent, copper (I)-hydride, hydrosilylation, organosilanes, bisphosphines