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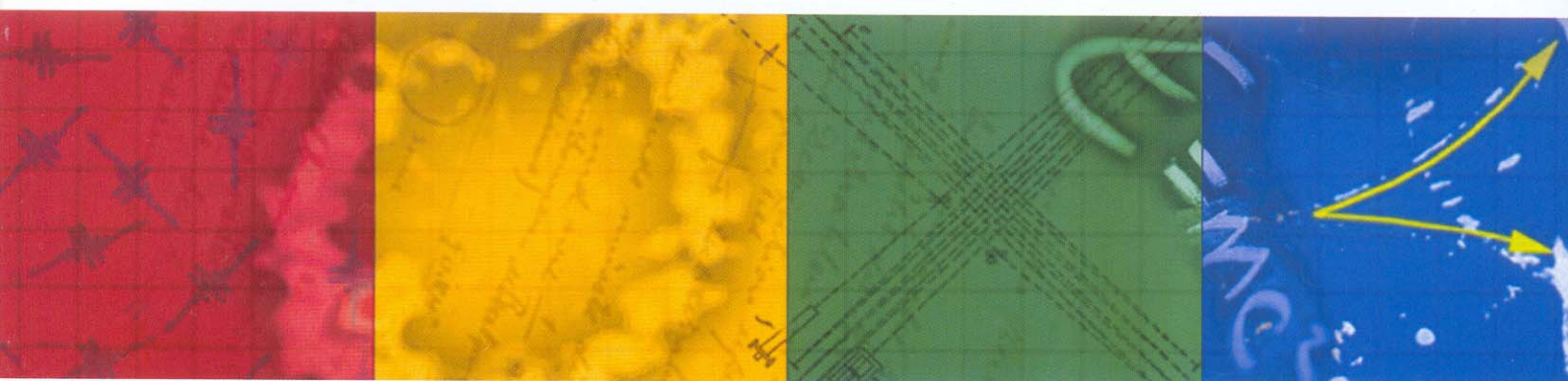
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# 회보

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<sup>2</sup>동의대학교 물리학과, <sup>3</sup>기초과학지원연구원 부산센터.) Homogeneous coprecipitation 방법으로 YAG:Ce 나노분말을 합성하였다. 합성한 YAG:Ce 나노분말의 결정상태를 SEM 사진, XRD 패턴을 통해 확인하였으며, PL, PLE 스펙트럼을 측정하여 형광특성을 연구하였다. Sintering 온도가 900°C일 때 부터 YAG 상이 나타났으며, 중간 결정상인 YAP, YAM 등은 나타나지 않았다. 첨가한 Ce의 양이 0.02에서 0.15로 증가함에 따라 YAG의 격자상수는 12.02 Å에서 12.09 Å로 증가하였으며, grain의 크기는 42nm에서 36nm로 감소하였다. 첨가한 Ce의 양이 0.002부터 0.02일 때에는 형광효율이 증가하였으며, 0.02 이상에서는 형광효율이 감소하고 형광파장이 red shift하였다. Ce은 반응조건에 따라 Ce<sup>3+</sup>와 Ce<sup>4+</sup>의 상태를 가진다. 열처리 과정에서 분위기에 따른 Ce의 산화상태를 XPS 스펙트럼으로 분석하였으며, Al<sup>IV</sup>(T<sub>d</sub>)와 Al<sup>VI</sup>(O<sub>h</sub>)의 site 비, Ce<sup>3+</sup>와 Y<sup>3+</sup>의 치환 유무를 연구하였다.

#### Ep1-015 Finite-Size Effects in Magnetic and

#### Transport Properties of Magnetite Nanoparticles

JANG Eung Young, JANG Jung-Tak<sup>1</sup>, CHOI Deung Jang, CHOI Jin-Sil<sup>1</sup>, CHEON Jinwoo<sup>1</sup>, KIM Tae Hee(Department of Physics, Ewha Womans University, Seoul 120-750, South Korea. <sup>1</sup>Department of Chemistry, Yonsei University, Seoul 120-749, South Korea.) Rapid development in nanotechnology has made it possible to make nanoparticles with more precision and to manipulate them. Magnetite (Fe<sub>3</sub>O<sub>4</sub>) nanoparticles is currently one of key materials for applications in magnetic storage and many bioinspired applications because bulk Fe<sub>3</sub>O<sub>4</sub> has a high Curie temperature (T<sub>c</sub> = ~850K) and nearly full spin polarization at room temperature (RT).[1] Magnetite is perhaps the oldest magnetic material known, however the understanding of the correlation between magnetic properties and particle size is incomplete. In this work, Fe<sub>3</sub>O<sub>4</sub> nanoparticles with different sizes ranging from 6 to 12 nm have been prepared in a well-controlled manner by a nonhydrolytic synthetic method. X-ray diffraction and HRTEM analysis showed a single cubic inverse spinel phase for our samples. Chemical analysis was also performed using EDX for synthesized magnetite nanoparticles. Here, we report the investigation of magnetism and magnetoresistance (MR) in Fe<sub>3</sub>O<sub>4</sub> nanoparticle pellets. Significant intergrain MR of ~ 10 % in 2 kG was observed at RT in highly monodispersed ( $\sigma \approx 5$  %) single crystalline Fe<sub>3</sub>O<sub>4</sub> nanoparticles. Superparamagnetic

(SPM) behavior was also observed in pressed pellets of magnetite at RT. The enhanced MR and the SPM behavior could arise from the subtle interplay between the intrinsic properties, size distribution of the nanoparticles, finite-size effects and the interparticle interactions.[2] Our results show clearly that finite-size effects dominate the magnetic behavior of individual nanoparticles, increasing their relevance as the particle size decreases.

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References: [1] J. M. D. Coey et al., Appl. Phys. Lett. 72, 734 (1998).

[2] X. Batlle and A. Labarta, J. Phys. D: Appl. Phys. 35, R15-R42 (2002).

#### Ep1-016 Electrical Properties of Polyacetylene

#### Nanoparticles Synthesized in Non-aqueous Emulsion System

안 세정, MUELLER Kevin<sup>1</sup>, KLAPPER MARKUS<sup>1</sup>, MUELLEN KLAUS<sup>1</sup>, 박 영우<sup>2</sup>(서울대학교 나노과학기술협동과정. <sup>1</sup>Max Planck Institute for Polymer Research, Germany. <sup>2</sup>서울대학교 물리학과.) We have synthesized polyacetylene (PA) nanoparticles in the non-aqueous emulsion system using a Luttinger catalyst. The nonaqueous emulsion system consists of cyclohexane as the continuous and acetonitrile as the dispersed phase, and the poly(isoprene)-block-poly(methylmethacrylate) (PI-b-PMMA) copolymers were added to stabilize the system as the emulsifiers. The obtained PA nanoparticles were dispersed in the pure n-hexane. Atomic force microscopy (AFM) and scanning electron microscopy (SEM) images reveal that PA nanoparticles have the spherical geometry with the typical size of 40 nm ( $\pm 10$  nm). The electrical transport measurement of pellets formed with the iodine doped PA nanoparticles was carried out by the four-probe technique. Also, the electrical transport properties of a single iodine doped polyacetylene nanoparticle were carried out by the conducting probe atomic force microscopy (CP-AFM).

#### Ep1-017 Size-Dependent Characteristics of Electrochemically Synthesized Conducting Polymer Nanomaterials

HONG Young ki, PARK Dong hyuk, KIM Bo hyun<sup>1</sup>, JOO Jinsoo<sup>1</sup>(*Department of Physics, Korea University.*  
<sup>1</sup>*Department of Physics, Kkorea University.*) We fabricated nanoporous anodic aluminum oxide (Al<sub>2</sub>O<sub>3</sub>) templates with various diameter (20 nm ~ 80 nm) by anodizing aluminum plate in acidic solution. Using these templates and purchased nanoporous templates,  $\pi$ -conjugated polypyrrole (PPy) nanomaterials with various sizes were synthesized through electrochemical polymerization method. From scanning electron microscope and transmission electron microscope photographs, we observed the formation of nanowires with various diameters and obtained relatively long nanowires of PPy ( $\geq 40 \mu\text{m}$  in length). To discern the structural, conformational, and optical properties of the  $\pi$ -conjugated polymeric nano-systems, Fourier transform-infrared spectroscopy and ultraviolet-visible absorption spectroscopy were performed. The electrical properties of the  $\pi$ -conjugated polymeric nano-systems were investigated by measuring DC conductivities of conducting PPy nanomaterials using 2-probe and 4-probe patterns. From the experimental data, we discuss about size-dependent characteristics of conducting PPy nanomaterials.

**Ep1-018** Zn<sub>2</sub>SiO<sub>4</sub>:Mn,Al형 광체의 발광특성

이 지영, 유 일(동의대학교 물리학과.) Zn<sub>2</sub>SiO<sub>4</sub>:Mn에 NH<sub>4</sub>Cl와 Al의 농도를 변화시켜 PDP용 녹색 형광체를 고상반응법으로 제조하였다. NH<sub>4</sub>Cl과 Al의 농도 변화에 따라 발광세기와 색순도의 변화를 관찰하였다. Zn<sub>2</sub>SiO<sub>4</sub>:Mn은 상온에서 <sup>4</sup>T<sub>1</sub>→<sup>6</sup>A 전이에 의해 녹색 발광이 관찰되었다. Zn<sub>2</sub>SiO<sub>4</sub>:Mn에 NH<sub>4</sub>Cl 15mol% 첨가한 경우, NH<sub>4</sub>Cl을 첨가하지 않았을 경우 보다 2~3배 정도의 휘도 상승을 가져왔다. Zn<sub>2</sub>SiO<sub>4</sub>:Mn에 Al을 첨가시 Zn<sub>2</sub>SiO<sub>4</sub>에 ZnAl<sub>2</sub>O<sub>4</sub> 결정이 동시에 존재함으로써 525nm인 일반적인 녹색발광에서 장파장의 황색발광으로 이동함을 관찰하였다.

**Ep1-019** Poly 3-methylthiophene(P3MT) 나노튜브와 Poly 9-vinylcarbazole (PVK) 복합체를 이용하여 제작된 발광 소자의 전기적 광학적 특성

이 용백, 박 동혁<sup>1</sup>, 김 현승<sup>1</sup>, 홍 영기<sup>1</sup>, 주 진수<sup>1</sup>(*고려대학교 물리학과.*<sup>1</sup>*고려대학교물리학과.*) 나노직경을 갖고 있는 Al<sub>2</sub>O<sub>3</sub>(다공성 무기 배경물질)를 이용하여 poly 3-methylthiophene(P3MT)을 전기중합방법으로 나노튜브를 합성하였다. HF 혹은 NaOH을 이용하여 배경물질을 제거한 후 전자주사 현미경(SEM)과 투과 전자 현미경

(TEM) 실험을 통해서 길이가 약 40  $\mu\text{m}$  이고, 직경이 100~150 nm인 나노튜브로 중합되었음을 확인하였다. P3MT 나노튜브와 poly 9-vinylcarbazole(PVK)를 이용하여 복합체를 합성하였다. P3MT와 PVK를 혼합한 후 그 복합체의 광학적 특성을 확인하기 위해 UV/Vis 흡수와 PL 측정실험을 수행하였다. P3MT와 PVK 복합체를 이용하여 유기 발광다이오드를 제작한 후 전기적, 광학적 특성을 관찰하였다.

**Ep1-020** Fabrication of high current field emitter

from carbon nano fiber films under extremely small patterns 채 교원, 이 순일, 고 근하(*아주대학교 에너지시스템학부.*) We report high current density field emission from carbon nanofiber (CNF) films synthesized using electroplated Ni catalysts on gold buffer layers via hot-filament chemical vapor deposition (HFCVD) method. Furthermore, we make sufficient field emitter under various conditions - synthesized temperature & thickness of Ni films. Thickness of Ni films & Temperature during HFCVD process are very dominant factor to synthesize good CNF that use field emission cathode. Specially, we find the condition to synthesize CNF sufficient for using field emission cathode. Furthermore, we make CNF emitter to use extremely small patterns and verify its emission properties.

**Ep1-021** Defect-induced loading of Pt nanoparticles on carbon nanotubes

KIM Sung Jin, KIM Ki Kang, AN Kay Hyeok, LEE Young Hee (*Sungkyunkwan University, Physics Division.*) Nanostructured carbon materials are potentially of great technological interest for the development of electronic, catalytic, hydrogen-storage and fuel cell systems. Carbon nanotubes (CNTs)-supported Pt nanoparticle catalysts were prepared by a rapid microwave technique for fuel cells. Microwave rapid heating has received considerable attention as a new promising method for the preparation of carbon support. Yet, the uniform distribution of Pt nanoparticles and monodispersion in sizes are still far from practical limit. In this work, we introduced defects of carbon nanotubes by using additional oxidant during strong acid treatment. Pt nanoparticles were loaded on carbon nanotubes under microwave oven. Our Raman spectra and X-ray diffraction analysis proved that the defect created during oxidation and mi-